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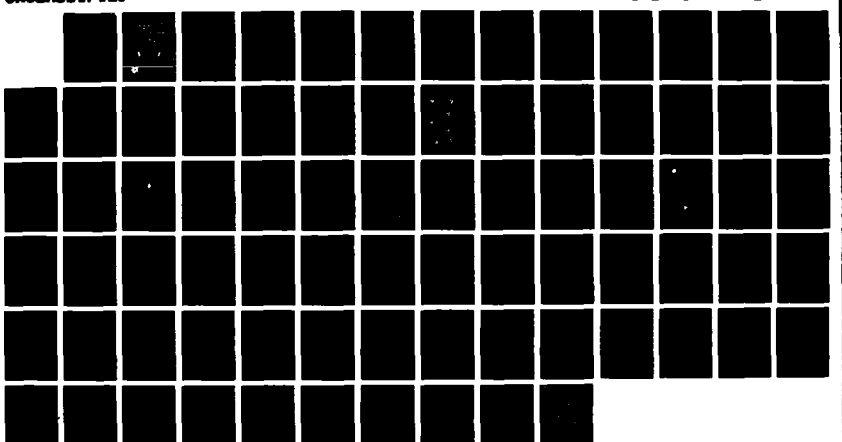

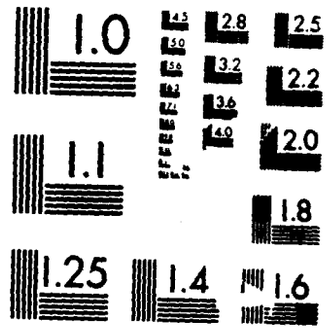

BATTLE MANAGEMENT/ COMMAND AND CONTROL, AND COMMUNICATIONS (BM/C^3)

DEMONSTRATION/VALIDATION PROGRAM ENVIRONMENTAL ASSESSMENT AUGUST 1987

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
SYSTEMS ENGINEERING
WASHINGTON D.C. 20301-7100

Cover Sheet

Responsible Agency: Strategic Defense Initiative Organization

Proposed Action: Conduct Demonstration/Validation tests of the Battle Management/Command and Control, and Communications (BM/C^3) technology.

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Designation: Environmental Assessment

Abstract: The Strategic Defense Initiative Organization (SDIO) and its proponents (U.S. Army and U.S. Air Force) plan to conduct Demonstration/Validation tests of the BM/C^3 technology. These tests will demonstrate the ability of the technology to perform the required tasks, and will validate a future decision on whether to proceed with Full-Scale Development. Demonstration/Validation tests would be conducted at the Advanced Research Center, Electronic Systems Divison, National Test Facility, Rome Air Development Center, Nevada Test Site, Harry Diamond Laboratories, and at contractor facilities. Tests would include analyses, simulations, and component/assembly tests. This document addresses the potential environmental consequences of the Demonstration/Validation testing of the BM/C^3 technology.

Available to the Public: August 1987

A-1

EXECUTIVE SUMMARY

INTRODUCTION

The National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), and the Department of Defense (DoD) Directive 6050.1 which supplements these regulations, direct that DoD officials take into account environmental consequences when authorizing or approving major Federal actions in the United States. Accordingly, this Environmental Assessment analyzes the potential environmental consequences of a proposed transition from Concept Exploration to Demonstration/Validation of the Battle Management/Command and Control, and Communications (BM/C^3) technology, one of the technologies being considered in the Strategic Defense Initiative program. The tests and evaluations associated with Demonstration/Validation will be in accordance with the Antiballistic Missile Treaty and are currently structured to conform with the restrictive interpretation of the Treaty. The decision to proceed to Demonstration/Validation for BM/C^3 would not preclude other technologies, nor would it mandate the eventual Full-Scale Development or Production/Deployment of BM/C^3.

BACKGROUND

The President's announcement of a Strategic Defense Initiative on March 23, 1983, initiated an extensive research program to determine the feasibility of developing an effective ballistic missile defense system to protect the United States and its allies from enemy missile attack. The Strategic Defense Initiative Organization was established to plan, organize, coordinate, direct, and enhance the research and testing of technologies applicable to strategic defense. Future implementation of a Strategic Defense System would be based on the Strategic Defense Initiative research program.

Many technologies currently are being investigated. Among the technologies being considered for Demonstration/Validation are space-based technologies:

- o Boost Surveillance and Tracking System (BSTS)
- o Space-based Surveillance and Tracking System (SSTS)
- o Space-Based Interceptor (SBI)

and ground-based technologies:

- o Exoatmospheric Reentry Vehicle Interception System (ERIS)
- o Ground-based Surveillance and Tracking System (GSTS)
- o Battle Management/Command and Control, and Communications (BM/C^3).

DoD Directive 5000.1 calls for a staged approach to the DoD acquisition process. In keeping with that mandate, DoD's major system acquisition process consists of four distinct stages: Concept Exploration, Demonstration/Validation, Full-Scale Development, and Production/Deployment. These four stages are separated by three major decision points (Milestones I, II, and III). Prior to Milestone I, the Defense Acquisition Board will review the results of Concept Exploration and decide whether the subject technology will

be carried forward into Demonstration/Validation or remain in the Concept Exploration stage. The BM/C^3 Strategic Defense Initiative technology is approaching the end of Concept Exploration and is preparing for Demonstration/ Validation.

PURPOSE AND NEED

The purpose of the Demonstration/Validation program for BM/C^3 is to determine the ability of the technology to perform its intended function, and to provide the information necessary to make an informed decision whether to proceed with Full-Scale Development. These activities are the first steps needed to support a decision to develop, produce and deploy the BM/C^3 technology, which is integral to an effective strategic defense.

The function of BM/C^3 would be to coordinate a multitiered defense against ballistic missile attacks. The technology must be able to operate in a nuclear environment and under direct enemy attack. Surveillance satellites, airborne sensors, and ground radars would locate targets and communicate tracking information to battle management, which would process the information and communicate target assignments to space- and ground-based weapons. BM/C^3 system architecture would combine space-based and ground-based system architectures linked by a communications network (54).

PROPOSED ACTION

The proposed action is the Demonstration/Validation program for the BM/C^3 technology. This program would demonstrate whether the system can meet its specific performance requirements and would provide the information necessary for the Defense Acquisition Board to recommend a Milestone II decision to proceed into Full-Scale Development.

BM/C^3 Demonstration/Validation activities would include analyses, simulations, and component/assembly testing of the communications, battle management, and command and control computer hardware and software. Most testing activities would occur in existing facilities.

Demonstration/Validation of BM/C^3 would address the following technological issues:

- Battle Management: Test the ability of battle managers to use multiple sensors in target data acquisition; assess the efficiency of targeting algorithms for coping with increasing threats and changing scenarios; determine how the network responds to unexpected high traffic volume; analyze ability to support evolution of the system; and measure sensitivity to increased threat severity.

- Command and Control: Test the adequacy of decision aids and interfaces to provide decisionmaker support under any threat scenario and ensure the ability of control provisions to maintain positive control under all crisis and engagement scenarios.

- o Communications Network: Determine the ability to counter disruption from jamming and nuclear effects; test the capability to reconfigure under high attrition situations; determine adequacy of system assets to perform under surprise conditions; test ability to react to National Command Authority decisions; determine reaction to unplanned losses or upsets to sensors, weapons, communications, and command centers; and assess capability of humans to oversee, interpret, assimilate, react, and control.

- o Overall System: Measure capability to handle volume after extended dormancy; confirm acceptability of error rates; determine effectiveness of security measures to counter interception, interdiction, or interruption; test ability of processing systems to recover from transient data losses; confirm the ability of the nodes to rapidly reconfigure and compensate for loss; test adequacy of data protection; and evaluate ability of support system to evolve.

The Demonstration/Validation testing activities for the BM/C^3 program fall into three categories: analyses, simulations, and component/assembly tests. The tests and their proposed locations are provided in Table S-1.

NO-ACTION ALTERNATIVE

The no-action alternative is to continue with Concept Exploration activities without progressing to the Demonstration/Validation stage at this time.

ENVIRONMENTAL SETTING

The test activities of the BM/C^3 Demonstration/Validation program would be carried out in contractor facilities that have not yet been identified, and in six government facilities. The government facilities are the Advanced Research Center, Electronic Systems Division, National Test Facility, Rome Air Development Center, Nevada Test Site, and Harry Diamond Laboratories. The attributes of each of these government facilities as they relate to the proposed testing activities follow.

The Advanced Research Center is located near the Redstone Arsenal outside of Huntsville, Alabama. The Center performs computer simulations for ground-based missile systems under development. The Center consists of computers and peripheral equipment used in advanced data processing research.

The Electronic Systems Division has administrative offices located on Hanscom Air Force Base, approximately 17 miles north of Boston, Massachusetts. It is responsible for developing, acquiring, and delivering electronic systems and equipment for the command, control, communications, and intelligence functions for aerospace forces. Some Electronic Systems Division activities are housed in a building located in Lexington, Massachusetts, about 1/2 mile from the base. The building is leased by the MITRE Corporation.

The National Test Facility will be constructed at Falcon Air Force Station in Colorado. An interim facility will be operated out of the Consolidated Space

TABLE S-1.
DEMONSTRATION/VALIDATION TESTING FOR
BATTLE MANAGEMENT/COMMAND AND CONTROL, AND COMMUNICATIONS

TEST ACTIVITIES	TEST TECHNIQUES: Analyses	Simulations	Component/ Assembly	LOCATIONS[1]
Command and Control: Decisions for weapon releases, situations/ status display, strategy, retention of human control, integration of contractor and government facilities results, architecture development and integration	X	X	HWIL[2]	Contractor facilities[3]
	X	X	HWIL[2]	National Test Facility[4]
	X	X	HWIL[2]	Rome Air Development Center
	X	X	HWIL[2]	Electronic Systems Division
	X	X	HWIL[2]	Advanced Research Center
Battle Management: Multisensor tracking and discrimination, dissemination of sensor data, computer programs to coordinate actions between elements of battle management, space technology ability to adapt to changes in enemy strategy, operation in war environment, and architecture development and integration	X	X	HWIL[2]	Contractor facilities[3]
	X	X	HWIL[2]	Rome Air Development Center

[1] Adequate facilities exist unless otherwise noted.

[2] Hardware-in-the-loop. Refers to tests in which BM/C^3 computer and communication test systems will be in communication with some of the hardware test facilities developed for other Strategic Defense Initiative technology programs.

[3] Contractors will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

[4] Facility construction or modification required (excluding minor modification).

TABLE S-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR
BATTLE MANAGEMENT/COMMAND AND CONTROL, AND COMMUNICATIONS

TEST ACTIVITIES	TEST TECHNIQUES			LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	
Data Processing: Merging of multiple sensor data, fault tolerance, reconfiguration and restart software on-orbit maintenance, determination of the ability of circuitry to withstand a nuclear environment, software security, hardware security, parallel processing, and architecture development and integration	X	X	HWIL[2], Radiation Chamber	Contractor facilities[3]
	X	X	HWIL[2]	Advanced Research Center
	X	X	HWIL[2], Space Chamber[2]	Rome Air Development Center
	X	X	HWIL[2]	Electronic Systems Division
			Broad Spectrum Radiation	Nevada Test Site
			Radiation Chamber, Electromagnetic Pulse Test Facility	Harry Diamond Laboratories
Communications: Architecture development and integration	X	X		Contractor facilities[3]
	X	X		Rome Air Development Center

[1] Adequate facilities exist unless otherwise noted.

[2] Hardware-in-the-loop. Refers to tests in which BM/C^3 computer and communication test systems will be in communication with some of the hardware test facilities developed for other Strategic Defense Initiative technology programs.

[3] Contractors will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

[4] Facility construction or modification required (excluding minor modification).

Operations Center, also located at Falcon Air Force Station, until construction is complete.

The Rome Air Development Center is located at Griffiss Air Force Base, one mile north of Rome, New York. The Center's mission includes communications, surveillance, intelligence data handling, information systems technology, and artificial intelligence. The Center occupies more than 18 acres of floor space and maintains a staff of 1,300 civilian and military personnel.

The Nevada Test Site is located approximately 65 miles northwest of Las Vegas, Nevada. The main function of the site is underground testing of nuclear devices.

Harry Diamond Laboratories have central facilities in Adelphi, Maryland, and another testing facility in Woodbridge, Virginia. The Aurora Facility at Adelphi can test the survivability of electronic circuitry exposed to radiation in a radiation chamber. The Woodbridge Research Facility can test the survivability of materials subjected to electromagnetic pulse. These types of tests are done on a regular basis at Harry Diamond Laboratories; the radiation chamber is used on a constant basis with a small dedicated staff and the electromagnetic pulse test facility is also used on a regular basis.

ENVIRONMENTAL CONSEQUENCES

Many of the tests for the BM/C^3 Demonstration/Validation program would be conducted at contractor facilities that have not been identified. These contractors would be selected through the DoD procurement process and would be required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations. If the procurement process required a selected contractor to use Federal funds to conduct an activity with a potential for significant environmental consequences, an environmental analysis of the consequences of such activities would also be required of the contractor. This analysis would be utilized by DoD in completing an environmental assessment or environmental impact statement, as appropriate.

To assess the potential for and the magnitude of impacts from Demonstration/Validation at each government facility, a two-step methodology was utilized. The first step was the application of assessment criteria to identify activities with no potential for significant environmental consequences. Activities were deemed to present no potential for significant environmental consequences if they met all of the following criteria (i.e., all "yes" answers):

1. Are the facility and its infrastructure adequate for the proposed activity (i.e., can the tests be conducted without new construction, excluding minor modifications)?

2. Is current staffing at the facility adequate to conduct the test, excluding minor staff level adjustments?

3. Does the facility comply with existing environmental standards?

4. Are the resources of the surrounding community adequate to accommodate the proposed testing?

If a proposed test was determined to present a potential for impact (i.e., a "no" answer to any of the above questions), the second step was to evaluate the activity in the context of the following environmental considerations: air quality, water quality, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be **insignificant** if, in the judgment of the analysts or as concluded in existing environmental documentation, no potential for significant environmental impacts exists. Consequences were deemed **mitigable** if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious consequences exist that could not be readily mitigated, the activity was determined to represent **potentially significant** environmental impacts.

The environmental consequences of BM/C^3 testing at the **Advanced Research Center** are anticipated to be **insignificant**. Tests to be conducted would involve computer simulations for determining processing speeds, data base sizing, and memory requirements. BM/C^3 testing would be performed in a new privately owned building and would use 23 existing and 5 to 6 new computers. Existing staff of 70 people would perform the computer simulations. The existing infrastructure and facilities are deemed adequate for the proposed tests. The Advanced Research Center is in compliance with all existing environmental regulations.

The environmental consequences of BM/C^3 activities performed by the **Electronic Systems Division** are anticipated to be **insignificant**. Activities would include administrative functions at Hanscom Air Force Base and analyses, simulations, and component/assembly testing using computers in the MITRE Corporation building. Approximately 75 existing Electronic Systems Division staff and 125 MITRE Corporation staff would be involved in the activities. BM/C^3 activities would be within the normal scope of work. No new facilities would be required.

The environmental consequences of constructing and operating the **National Test Facility** at Falcon Air Force Station are deemed to be **mitigable**. The consequences have been analyzed in "National Test Facility Environmental Assessment," which also identifies the necessary mitigation measures. The National Test Facility would employ 2,300 workers in a new facility. Until this facility is constructed, workers would be located in existing facilities at Falcon Air Force Station. Air quality, infrastructure, and land use impacts from construction and operation would be mitigable through the use of standard control and conservation practices. No significant impacts are expected on water quality, biological resources, hazardous waste, visual and cultural resources, noise, or socioeconomics.

The environmental consequences of BM/C^3 activities at the **Rome Air Development Center** are anticipated to be **insignificant**. Test activities would involve analyses, simulations, and component/assembly (hardware-in-the-loop) testing

related to command, control, and communications architectures and integration. The facilities to be used already exist, but a 20 x 50-foot annex would be added to contain a cryogenic space chamber. Construction activities would be minor. About five additional staff would be required to operate the facility. The addition of five personnel to the Rome Air Development Center staff, when compared to the staffing level of 7,400 at the base, would not result in any significant socioeconomic impacts.

The environmental consequences of BM/C^3 activities at the Nevada Test Site would be insignificant. Activities would include exposure of components and assemblies to broad-spectrum radiation resulting from an underground nuclear test scheduled for other programs. No facility/infrastructure modification or additional staff would be required as a consequence of BM/C^3 testing and the facility is in compliance with environmental standards.

Environmental impacts at Harry Diamond Laboratories, beyond those that result from normal operations, would not be expected from BM/C^3 testing. The Aurora Facility would conduct radiation testing within its regular schedule with an increase of four or five staff. The environmental consequences of the testing at the Aurora Facility would be insignificant. The Woodbridge Research Facility would test hardening of circuitry subjected to electromagnetic pulse. The electromagnetic pulse test facility is used on a regular basis and would require no additional staff. However, the electromagnetic pulse test facility at the Woodbridge Research Facility is the subject of a civil action for insufficient National Environmental Policy Act documentation (58). Harry Diamond Laboratories is in the process of preparing the required site-specific environmental documentation for the electromagnetic pulse test facility. Any impacts cited in the operational environmental impact statement in preparation would be mitigated in BM/C^3 testing.

If the no-action alternative is selected, no significant environmental impacts are anticipated, as current Concept Exploration activities would continue with utilization of current staffing and facilities.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the BM/C^3 through the Demonstration/Validation stage would result in irreversible and irretrievable commitment of resources such as electronic components, various metallic and nonmetallic structural materials, fuel, and labor. This commitment of resources is not different from those necessary for many other aerospace research and development programs; it is similar to the activities that have been carried out in previous aerospace programs over the past several years.

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1. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), and the Department of Defense (DoD) Directive 6050.1 which supplements these regulations, direct that DoD officials take into account environmental consequences when authorizing or approving major Federal actions in the United States. Accordingly, this Environmental Assessment analyzes the potential environmental consequences of a proposed transition from Concept Exploration to Demonstration/Validation of Battle Management/Command and Control, and Communications (BM/C^3), one of the technologies being considered in the Strategic Defense Initiative program. The tests and evaluations associated with Demonstration/Validation will be in accordance with the Antiballistic Missile Treaty and are currently structured to conform to the restrictive interpretation of the Treaty. The decision to proceed to Demonstration/Validation for BM/C^3 would not preclude other technologies, nor would it mandate the eventual Full-Scale Development or Production/Deployment of BM/C^3.

The approach followed to complete this assessment is presented in Figure 1-1. This section describes the test and evaluation activities that would be completed for BM/C^3 and identifies the contractor and government facilities where the activities would be carried out. Section 2 characterizes those facilities and the surrounding communities and Section 3 assesses the potential environmental consequences of the activities.

Demonstration/Validation of the BM/C^3 technology would consist of a number of tests. Descriptions of these tests were developed from documentation describing the BM/C^3 Demonstration/Validation program and interviews with program personnel who developed the documentation. Section 1.3 describes the types of tests and their locations. Also, where possible, other factors related to the tests, such as work force or hazardous materials requirements, have been described.

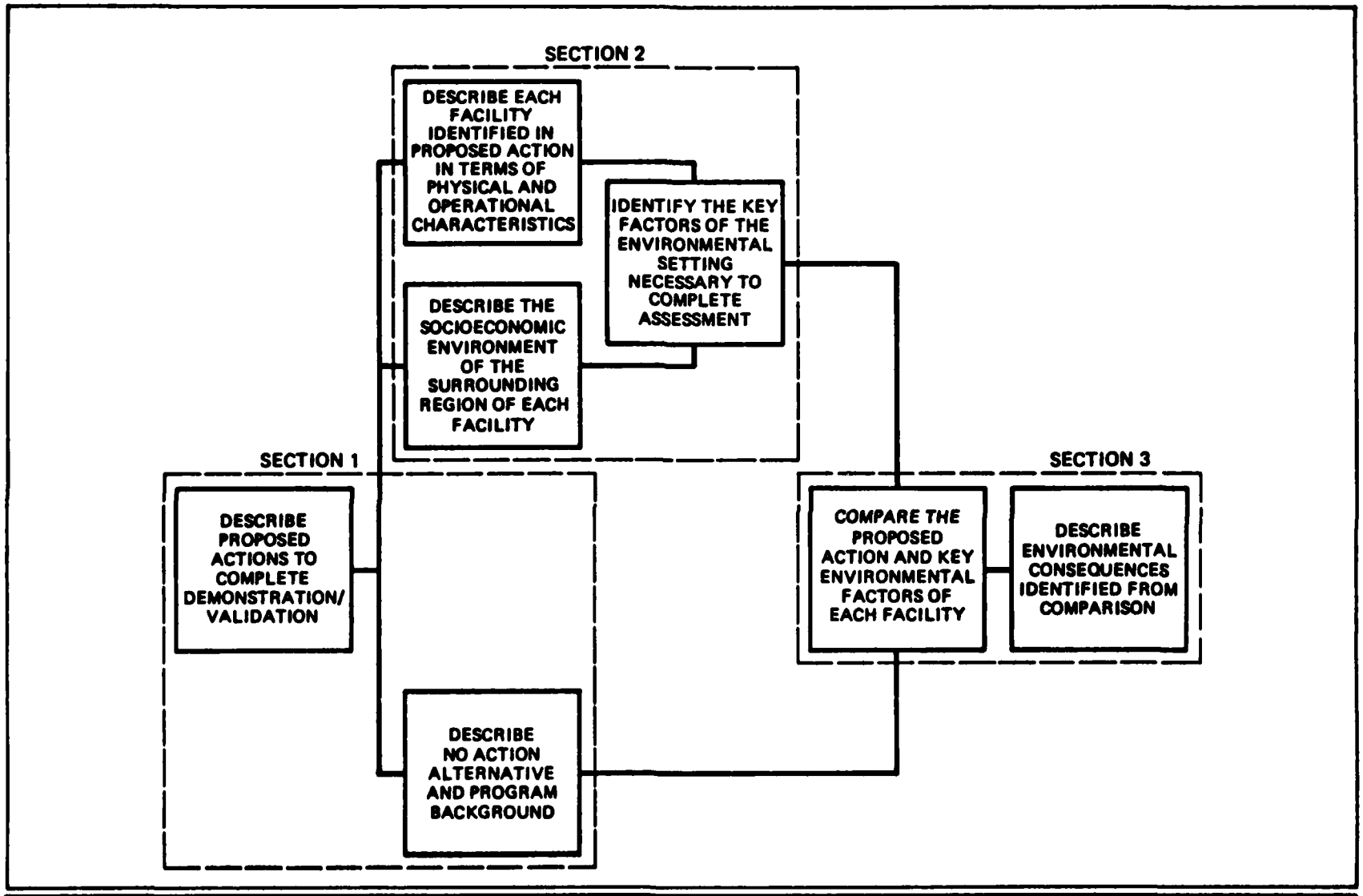
The remainder of this section briefly describes the background of the Strategic Defense Initiative program, the purpose of and need for the BM/C^3 technology, the proposed action, and the no-action alternative.

1.1 BACKGROUND

The President's announcement of a Strategic Defense Initiative on March 23, 1983, initiated an extensive research program to determine the feasibility of developing an effective ballistic missile defense system to protect the United States and its allies from enemy missile attack. The Strategic Defense Initiative Organization was established to plan, organize, coordinate, direct, and enhance the research and testing of technologies applicable to strategic defense. Future implementation of a Strategic Defense System would be based on the Strategic Defense Initiative research program.

1.1.1 Classes of Architecture

The Strategic Defense Initiative has produced several candidate architecture options and has promoted advanced technology concepts to support these



GENERAL APPROACH TO COMPLETE ENVIRONMENTAL ASSESSMENT

FIGURE 1-1

architectures. The term "architecture" refers to the function and interrelationship of individual elements or subsystems within a possible system. To date, three classes of possible architecture have been defined (54):

- Combined space-based and ground-based sensors and weapons to counter long-range ballistic missiles
- Ground-based weapons to counter long-range ballistic missiles
- Airborne sensors and ground-based weapons to counter shorter-range tactical ballistic missiles.

The combined space- and ground-based architectures would employ a series of satellites to sense, track, and destroy the threatening missiles and reentry vehicles (i.e., warheads) in the boost, post-boost, or midcourse phase of their trajectory. A ground-based system, which would back up the satellites, would intercept warheads in the latter part of their flight. Early evolving systems for both space- and ground-based architectures would use kinetic-energy weapons; later systems may use directed-energy weapons (lasers or particle beams).

As currently envisioned, the ground-based architecture could meet an offensive missile in the midcourse and reentry phases, although boost-phase intercept capability (by use of ground-based directed-energy weapons) is currently being investigated. A series of satellites would provide early warning, and ground-based intercept vehicles would then destroy the incoming warhead.

The third architecture would use airborne sensors to track shorter-range tactical ballistic missiles and ground-based weapons for target destruction. The shorter flight times of tactical ballistic missiles would require fast identification, tracking, discrimination, and reaction, which in turn would require greater sensor sensitivity and faster data processing.

Many technologies currently are being investigated to support the three architectures described above. Among the technologies being considered for Demonstration/Validation are space-based technologies:

- Boost Surveillance and Tracking System (BSTS)
- Space-based Surveillance and Tracking System (SSTS)
- Space-Based Interceptor (SBI)

and ground-based technologies:

- Exoatmospheric Reentry Vehicle Interception System (ERIS)
- Ground-based Surveillance and Tracking System (GSTS)
- Battle Management/Command and Control, and Communications (BM/C^3).

BM/C^3, a ground-based system with space-based elements, would maximize the efficiency with which battle managers select and engage targets and assess kills and damage. It would use computers, satellites, communications, and display systems to monitor the activities and status of the space- and ground-based elements of the Strategic Defense System. If deployed, BM/C^3 would

provide the computational power, information display, telecommunications, and decision aids required by Strategic Defense System commanders to control and manage their sensors and weapons.

BM/C^3 would be a widely distributed computer network using technologically advanced processors and extremely fast data communications links. Mainframe computers located at ground-based command centers would be interlinked by fiber-optic and satellite communications systems. The command center would be linked to space-based Strategic Defense System elements by extremely high-frequency radio and wide-band laser communications. Mobile ground-based components would be linked by line-of-sight radio. External interfaces would be provided to elements outside the Strategic Defense System, including existing strategic forces, intelligence networks, theater forces, and other Army, Navy, and Air Force elements. Space-based Strategic Defense System elements may be interlinked by ultra-narrow-beam laser communications.

During the boost phase of an engagement, the BM/C^3 mission would be to process and distribute sensor data to the command centers, provide rapid and precise characterization of the attack, assign weapons, command onboard sensors to assist in tracking and discrimination, and, given proper authority, prosecute the boost engagement.

During the midcourse phase, the BM/C^3 would distribute sensor data to battle managers, predict hostile intent and probable targets, allocate weapons, control sensor search, use discriminators and multiple sensor data to identify lethal objects, modify strategies as required, and, given authority, prosecute the midcourse engagement.

In the terminal phase, the BM/C^3 mission would be the same as during the midcourse phase except that sensor data from ground-based elements would be distributed only to specific battle managers. Decisions and kill assessments would be transmitted to the command centers.

This Environmental Assessment addresses the BM/C^3 technology. Separate Environmental Assessments have been prepared for the other technologies being considered for Demonstration/Validation. The potential cumulative environmental effects of testing several technologies at the same facility are addressed in the Strategic Defense Initiative Demonstration/Validation Program Environmental Assessments Summary.

The Defense Acquisition Board will decide whether the BM/C^3 technology is ready to proceed to Demonstration/Validation based on examination of cost, schedule, readiness objectives, affordability, initial operational capability, conceptual soundness, and environmental consequences.

1.1.2 Stages of Strategic Defense Initiative Development

DoD Directive 5000.1 calls for a staged approach to the DoD acquisition process. In keeping with that mandate, DoD's major system acquisition process consists of four distinct stages: Concept Exploration, Demonstration/Validation, Full-Scale Development, and Production/Deployment. These four stages are separated by three major decision points (Milestones I, II, and III). Prior to Milestone I, the Defense Acquisition Board will review the results of Concept Exploration and decide whether the subject technology will

be carried forward into Demonstration/Validation or remain in the Concept Exploration stage. The BM/C^3 Strategic Defense Initiative technology is approaching the end of Concept Exploration and preparing for Demonstration/ Validation.

In Demonstration/Validation, the BM/C^3 technology is tested to demonstrate its ability to perform the task. The Demonstration/Validation stage for the BM/C^3 technology includes the following test techniques:

1. Analyses: Examining and evaluating data to define or refine the current knowledge of a technology

2. Simulations: The use of software models representing both the test article and the environment to determine performance abilities

3. Component/Assembly Tests: Demonstrating performance of components and assemblies under simulated conditions such as space or battle environments.

Some BM/C^3 Demonstration/Validation activities may require modifications or additions to existing government facilities. Should this occur, the need for supplemental environmental evaluation would be determined in conformance with Council on Environmental Quality and DoD regulations.

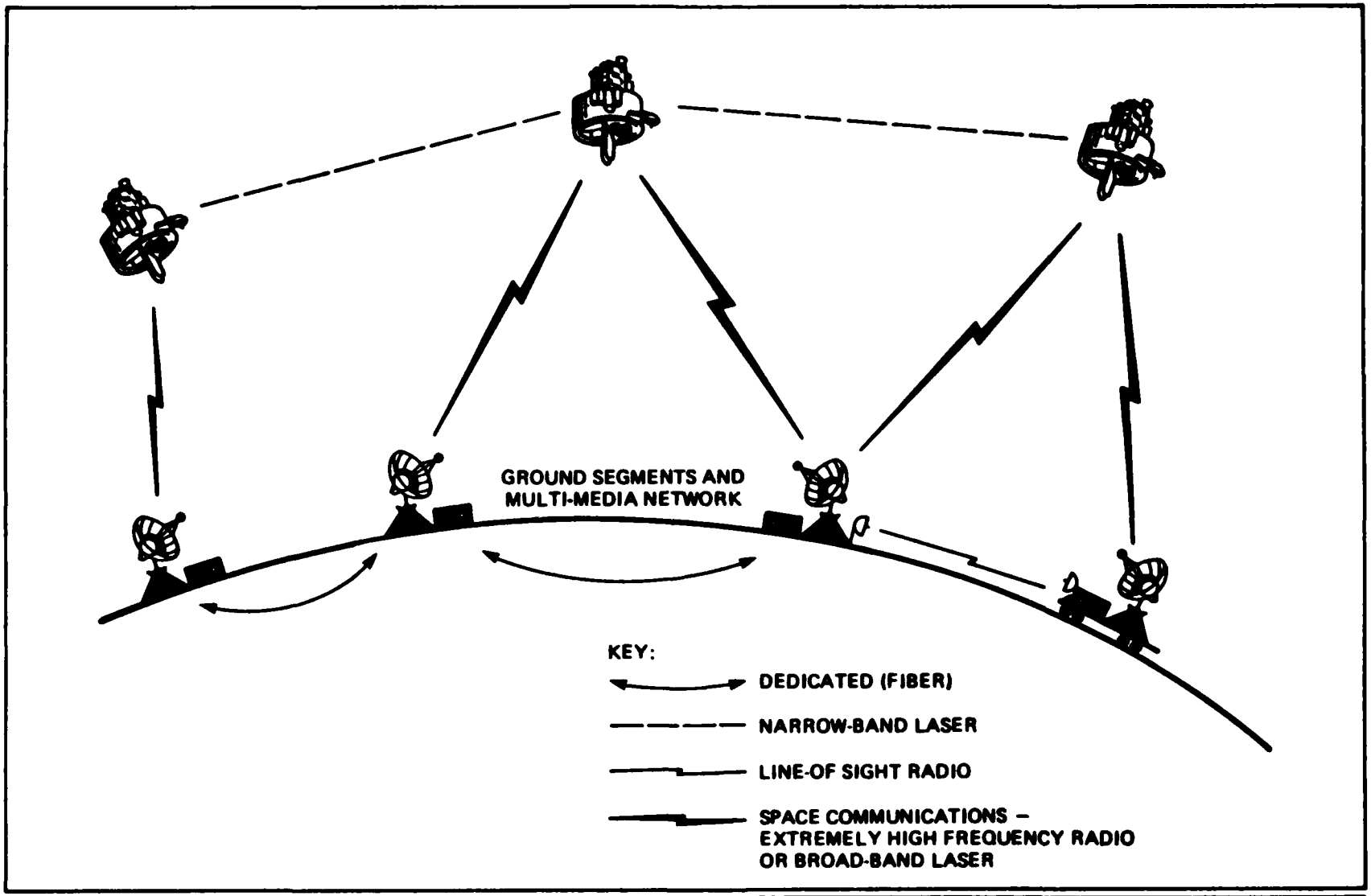
1.2 PURPOSE AND NEED

The purpose of the Demonstration/Validation program for BM/C^3 is to determine the ability of the technology to perform its intended function, and to provide the information necessary to make an informed decision whether to proceed with Full-Scale Development. These activities are the first steps needed to support a decision to develop, produce, and deploy the BM/C^3 technology, which is integral to an effective strategic defense.

The function of the BM/C^3 would be to coordinate a multitiered defense against ballistic missile attacks. The system must be able to operate in a nuclear environment and under direct enemy attack. Surveillance satellites, airborne sensors, and ground radars would locate targets and communicate tracking information to battle management, which would process the information and communicate target assignments to space- and ground-based weapons. BM/C^3 system architecture would combine space-based and ground-based system architectures linked by a communications network (Figure 1-2) (54).

1.3 PROPOSED ACTION

The proposed action is the Demonstration/Validation program for the BM/C^3 technology. This program would demonstrate whether the system can meet its specific performance requirements and would provide the information necessary for the Defense Acquisition Board to recommend a Milestone II decision to proceed into Full-Scale Development.



FUNCTIONAL CONCEPT OF
BATTLE MANAGEMENT/COMMAND, CONTROL, AND COMMUNICATIONS

FIGURE 1-2

Demonstration/Validation activities of BM/C^3 would include analyses, simulations, and component/assembly testing of the communications, battle management, and command and control computer hardware and software. Most testing activities would occur in existing facilities.

The U.S. Army Strategic Defense Command is developing the portion of BM/C^3 for the late-midcourse and terminal phases. The U.S. Air Force Electronic Systems Division is responsible for development of the portion of BM/C^3 for the boost and post-boost phases. Support resources will become nodes of the National Test Bed, which will have as its core the National Test Facility.

In addition to and apart from the experiments specific to the Strategic Defense Initiative, the Defense Advanced Research Project Agency is responsible for developing a space-based computer/communications experiment using advanced high-speed parallel processors on multiple satellites. Other communications experiments are being developed by this agency and the Air Force Rome Air Development Center. Laboratory work has been done at various national laboratories investigating the processor, algorithms, networking, and software development technologies.

Demonstration/Validation of BM/C^3 would address the following technological issues:

- Battle Management: Test the ability of battle managers to use multiple sensors in target data acquisition; assess the efficiency of targeting algorithms for coping with increasing threats and changing scenarios; test ability of processing systems to recover from transient data losses; confirm the ability of the nodes to rapidly reconfigure and compensate for loss; test the adequacy of data protection; and evaluate the ability of the support system to evolve.

- Command and Control: Test the adequacy of decision aids and interfaces to provide decisionmaker support under any threat scenario; and ensure the ability of control provisions to maintain positive control under all crisis and engagement scenarios.

- Communications Network: Determine the ability to counter disruption from jamming and nuclear effects; test the capability to reconfigure under high attrition situations; determine how the network responds to unexpected high traffic volume; analyze ability to support evolution; and measure sensitivity to increasing threat severity.

- Overall System: Measure capability to handle volume after extended dormancy; confirm acceptability of error rates; determine the effectiveness of security measures to counter interception, interdiction, or interruption; determine adequacy of system assets to perform under surprise conditions; test ability to react in real-time to National Command Authority decisions; determine reaction to unplanned losses or upsets to sensors, weapons, communications and command centers; assess capability of humans to oversee, interpret, assimilate, react, and control.

The Demonstration/Validation testing activities for the BM/C^3 are divided into analyses, simulations, and component/assembly tests. Each of these categories is described in greater detail in Appendix A. The BM/C^3 test activities and their locations are summarized in Table 1-1. The following paragraphs provide additional description of the test activities where appropriate. Figure 1-3 presents locations of the test facilities.

1.3.1 Analyses

Analyses would be performed for certain test activities of the BM/C^3 program, as shown in Table 1-1. Data would be gathered, stored, and analyzed from other Strategic Defense Initiative program elements for incorporation into BM/C^3 simulations and tests.

1.3.2 Simulations

Simulations create a digital representation of the physical world using specially developed computer software. Each simulation assigns a specific value to all physical parameters in the simulated system; these values are changed in subsequent simulations to determine: (1) how each parameter affects the simulated system, and (2) the optimal value for each parameter for maximum system efficiency. These simulations would occur at the Advanced Research Center, Rome Air Development Center, Electronic Systems Division, and contractor facilities.

1.3.3 Component/Assembly Tests

Nuclear environment tests of BM/C^3 components would take place at Harry Diamond Laboratories and the Nevada Test Site. These tests would be designed to examine component survivability when subjected to radiation. Hardware-in-the-loop experiments and space chamber testing would be done at various locations as shown in Table 1-1. These tests would consist of replacing a portion of a computer simulation with the actual component being tested and observing the component's reaction to stimulation. Hardware-in-the-loop experiments may also lead to refinements in the simulation program.

1.4 NO-ACTION ALTERNATIVE

The no-action alternative is to continue with Concept Exploration activities without progressing to the Demonstration/Validation stage at this time.

TABLE 1-1.
DEMONSTRATION/VALIDATION TESTING FOR
BATTLE MANAGEMENT/COMMAND AND CONTROL, AND COMMUNICATIONS

TEST ACTIVITIES	TEST TECHNIQUES			LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	
Command and Control: Decisions for weapon releases, situations/ status display, strategy, retention of human control, integration of contractor and government facilities results, architecture development and integration	X	X	HWIL[2]	Contractor facilities[3]
	X	X	HWIL[2]	National Test Facility[4]
	X	X	HWIL[2]	Rome Air Development Center
	X	X	HWIL[2]	Electronic Systems Division
	X	X	HWIL[2]	Advanced Research Center
Battle Management: Multisensor tracking and discrimination, dissemination of sensor data, computer programs to coordinate actions between elements of battle management, space technology ability to adapt to changes in enemy strategy, operation in war environment, and architecture development and integration	X	X	HWIL[2]	Contractor facilities[3]
	X	X	HWIL[2]	Rome Air Development Center

[1] Adequate facilities exist unless otherwise noted.

[2] Hardware-in-the-loop. Refers to tests in which BM/C^3 computer and communication test systems will be in communication with some of the hardware test facilities developed for other Strategic Defense Initiative technology programs.

[3] Contractors will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

[4] Facility construction or modification required (excluding minor modification).

TABLE 1-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR
BATTLE MANAGEMENT/COMMAND AND CONTROL, AND COMMUNICATIONS

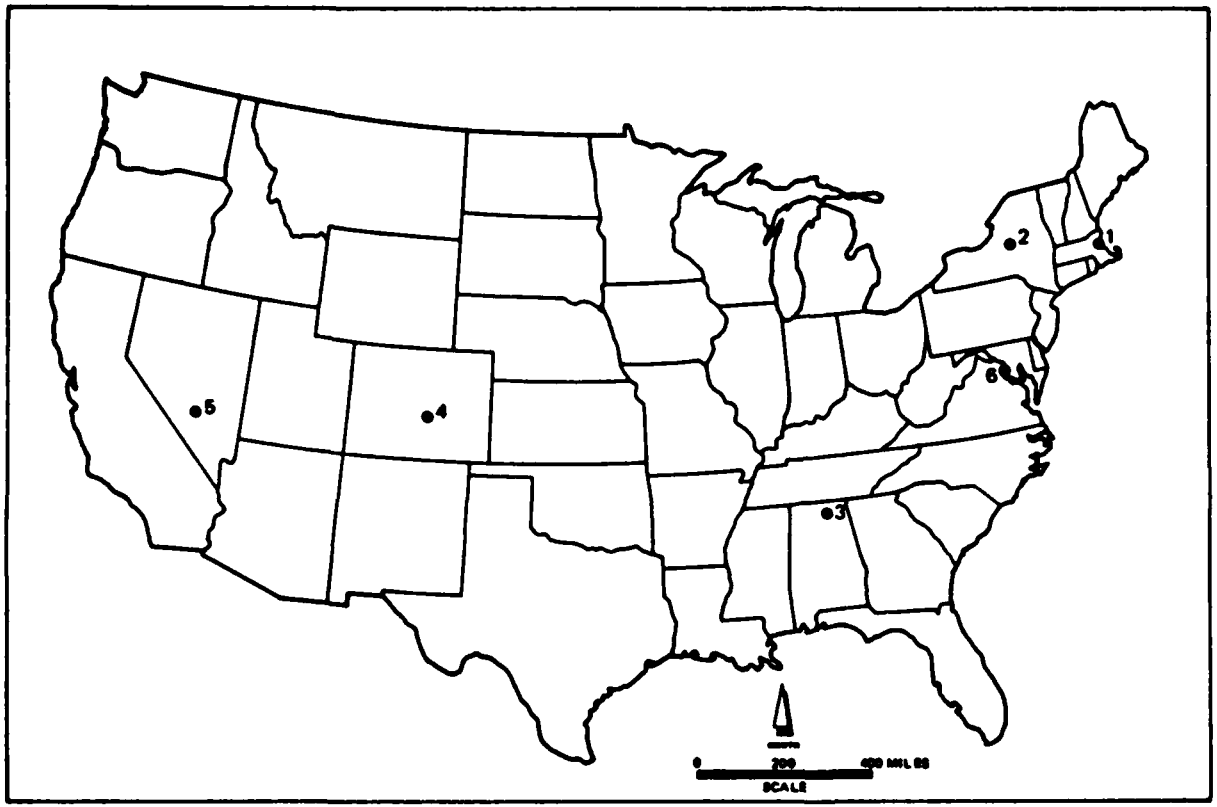
TEST ACTIVITIES	TEST TECHNIQUES: Analyses	Simulations	Component/ Assembly	LOCATIONS[1]
Data Processing: Merging of multiple sensor data, fault tolerance, reconfiguration and restart software on-orbit maintenance, determination of the ability of circuitry to withstand a nuclear environment, software security, hardware security, parallel processing, and architecture development and integration	X	X	HWIL[2], Radiation Chamber	Contractor facilities[3]
	X	X	HWIL[2]	Advanced Research Center
	X	X	HWIL[2], Space Chamber[2]	Rome Air Development Center
	X	X	HWIL[2]	Electronic Systems Division
			Broad Spectrum Radiation	Nevada Test Site
			Radiation Chamber, Electromagnetic Pulse Test Facility	Harry Diamond Laboratories
Communications: Architecture development and integration	X	X		Contractor facilities[3]
	X	X		Rome Air Development Center

[1] Adequate facilities exist unless otherwise noted.

[2] Hardware-in-the-loop. Refers to tests in which BM/C^3 computer and communication test systems will be in communication with some of the hardware test facilities developed for other Strategic Defense Initiative technology programs.

[3] Contractors will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

[4] Facility construction or modification required (excluding minor modification).



BATTLE MANAGEMENT/COMMAND AND CONTROL, AND COMMUNICATIONS
DEMONSTRATION/VALIDATION FACILITIES

FIGURE 1-3

2. ENVIRONMENTAL SETTING

The test activities of the BM/C^3 Demonstration/Validation program and the facilities where they would be conducted were identified in Table 1-1. Some of the tests would be conducted at contractor facilities not yet identified. Tests would also be conducted at government facilities at the Advanced Research Center, Electronic Systems Division, the National Test Facility, Rome Air Development Center, Nevada Test Site, and Harry Diamond Laboratories. This section describes the environmental setting of each government facility in terms of physical and operational characteristics, permit status, and previous environmental documentation. Specific physical characteristics include: facility size, base and test facilities, and environmental conditions. Operational characteristics include the socioeconomic variables of staffing, payroll, and housing, and the infrastructure characteristics of electricity, solid waste, sewage treatment, transportation, and water supply.

Permits described are those that relate to air quality, water quality, and hazardous waste. Previous environmental documentation includes environmental compliance plans, base master plans, environmental assessments, and environmental impact statements. The socioeconomic characteristics of the counties and communities surrounding the facility are also presented.

The data for each planned test facility are presented in tables and figures. The level of detail in these tables reflects the availability of pertinent program and facility information.

Many of the tests for the Demonstration/Validation program would be completed at contractor facilities. BM/C^3 contractors have yet to be selected through the DoD procurement process. The selected contractor would be required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations. If the procurement process required a selected contractor to use Federal funds to conduct an activity with a potential for significant environmental consequences, an environmental analysis of the consequences of such activities would also be required of the contractor. That analysis would be utilized by DoD in completing an environmental assessment or environmental impact statement, as appropriate.

The methodology employed in developing the descriptions of the government facilities that would be used in the program involved identifying and acquiring available literature for each facility to be used, such as environmental assessments, environmental impact statements, and base master plans. The literature was reviewed and data gaps (i.e., questions that could not be answered from the literature) were identified. To fill the data gaps, facility personnel were interviewed by telephone. Where this report utilizes information collected through telephone interviews, appropriate references are presented in the List of References, Section 6; primary contacts for each facility are listed in Section 5. The following subsections describe the environmental setting of each of the government facilities where Demonstration/Validation activities are planned.

Ten areas of environmental consideration are addressed: (1) air quality; (2) water quality; (3) biological resources; (4) infrastructure: electricity, solid waste, sewage treatment, water supply, transportation; (5) hazardous

vaste; (6) land use; (7) visual resources; (8) cultural resources; (9) noise; and (10) socioeconomics.

Several of the resource areas, specifically air and water quality, are regulated by federally mandated standards. The treatment, storage, and disposal of hazardous wastes are also regulated by Federal standards. Where federally mandated standards do not exist, qualitative evaluations were made. A discussion of each resource area is provided below.

Air Quality

Air quality concerns at each facility were evaluated in terms of the National Ambient Air Quality Standards and location of the facility in an attainment or nonattainment area. For existing air emissions sources, the facility was evaluated based on the emissions standards contained in the associated State Implementation Plan. Possible air emissions sources, such as expansion of facilities and new construction, were evaluated using the New Source Review requirements.

Water Quality

Water quality concerns at each location were identified and the facility's record of compliance with permits is presented.

Biological Resources

The Endangered Species Act protects plants and animals threatened with extinction. A review of the environmental documentation of the geographic area surrounding the facility was conducted to determine the documented presence of threatened and endangered species.

Infrastructure

Electricity, solid waste, sewage treatment, water supply, and transportation are infrastructure requirements that ultimately limit the capacity for growth. Capacity and current demand are described for each facility.

Hazardous Waste

The Resource Conservation Recovery Act regulates how a facility can dispose of its hazardous waste. The record of compliance was reviewed to determine the facility's capability to handle any additional wastes and to determine any potential disposal problems.

Land Use

Base master plans, environmental management plans, and other documentation were reviewed to determine any current conflicts between the facility and local standards, and to evaluate the probability of conflict resulting from any planned expansions.

Visual Resources

Existing environmental documentation was reviewed to determine if aesthetic concerns were an issue at any of the facilities.

Cultural Resources

Existing environmental documentation was reviewed to determine if any significant cultural resources in proximity to the facilities would be affected by test activities.

Noise

Existing environmental documentation was reviewed to determine if noise concerns were an issue at any of the facilities.

Socioeconomics

Key socioeconomic indicators (population, housing, employment, and income data) for the supporting region of each facility were examined to evaluate the potential consequences of increased population, expenditures, and employment.

2.1 ADVANCED RESEARCH CENTER

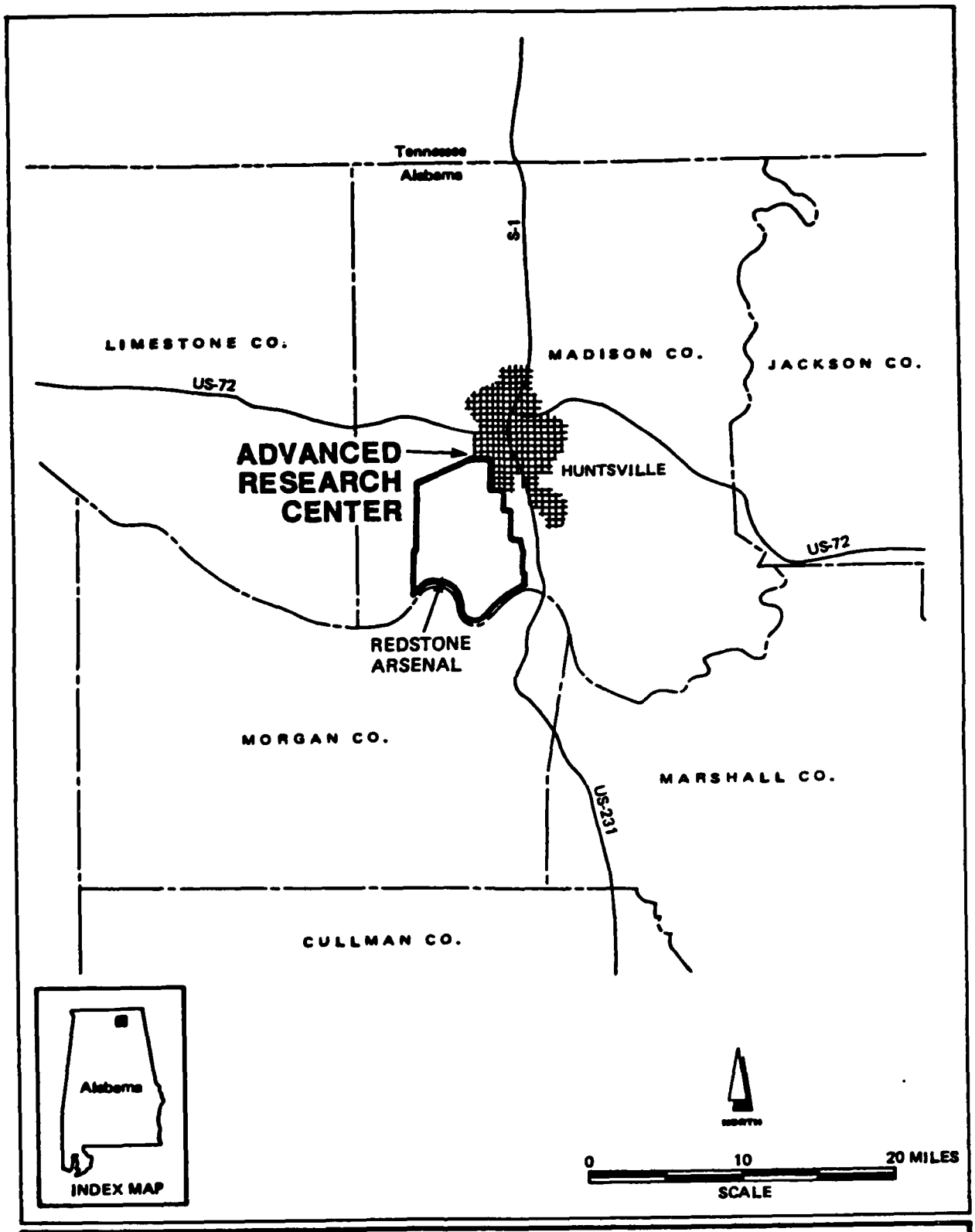
The Advanced Research Center is located in a leased building on private property a few miles from the Redstone Arsenal in Huntsville, Alabama (Figure 2-1). The Advanced Research Center is operated under the U.S. Army Strategic Defense Command Research and Technology Program (17). The Center performs computer simulations for ground-based missile systems under development using computers and peripheral equipment designed for advanced data processing research (16). Currently, the Center has a dedicated staff of 70 people (62). Computer simulation activities have been performed at the Center for the last 12 to 14 years (36, 60). A description of the facility and its environment is presented in Table 2-1.

For socioeconomic purposes, the supporting region for this facility is defined as the nearby community of Huntsville and surrounding Madison County. Table 2-2 contains selected socioeconomic data for these areas.

Based on available data, the Advanced Research Center is in compliance with Federal standards for air quality, water quality, and hazardous waste (63).

2.2 ELECTRONIC SYSTEMS DIVISION

The Electronic Systems Division administrative offices are located on Hanscom Air Force Base, approximately 17 miles northwest of Boston, Massachusetts (Figure 2-2). The office building (about 69,000 square feet) which will house the activities for BM/C^3 is located about 1/2 mile from the Air Force Base in Lexington, Massachusetts. This office building is leased by the MITRE Corporation (66). The staffing at the MITRE Corporation building includes about 150-200 people, 75 of whom are Electronic Systems Division employees. The balance is MITRE Corporation employees supporting the Electronic Systems



LOCATION MAP OF ADVANCED RESEARCH CENTER
AT HUNTSVILLE, ALABAMA

FIGURE 2-1

TABLE 2-1
SELECTED ENVIRONMENTAL CHARACTERISTICS
ADVANCED RESEARCH CENTER

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	45,000 square feet	62
		BASE FACILITIES	Administration building with offices; computers (13 VAX 11780s, 6 VAX 8800, 2 Aliant FX8s, 2 Convex C1) connected to a Cray computer on the first floor in the Strategic Defense Command Bldg. on Wynn Drive	16, 62
		TEST FACILITIES	Computer simulation facilities; center is a computing test bed for complex programs a focal point effort for the SDI project	60
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	None on facility	63
		VISUAL RESOURCES	Located in developed urban area with nice landscaping	62
		SPECIAL STATUS	No State or federally listed endangered species	63
		NOISE	No noise associated with computer simulation or facility	62
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Total 70	62
		PAYROLL	Funded by U.S. Army Strategic Defense Command, Huntsville, Alabama	17
		HOUSING	None on facility	62

TABLE 2-1 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
ADVANCED RESEARCH CENTER

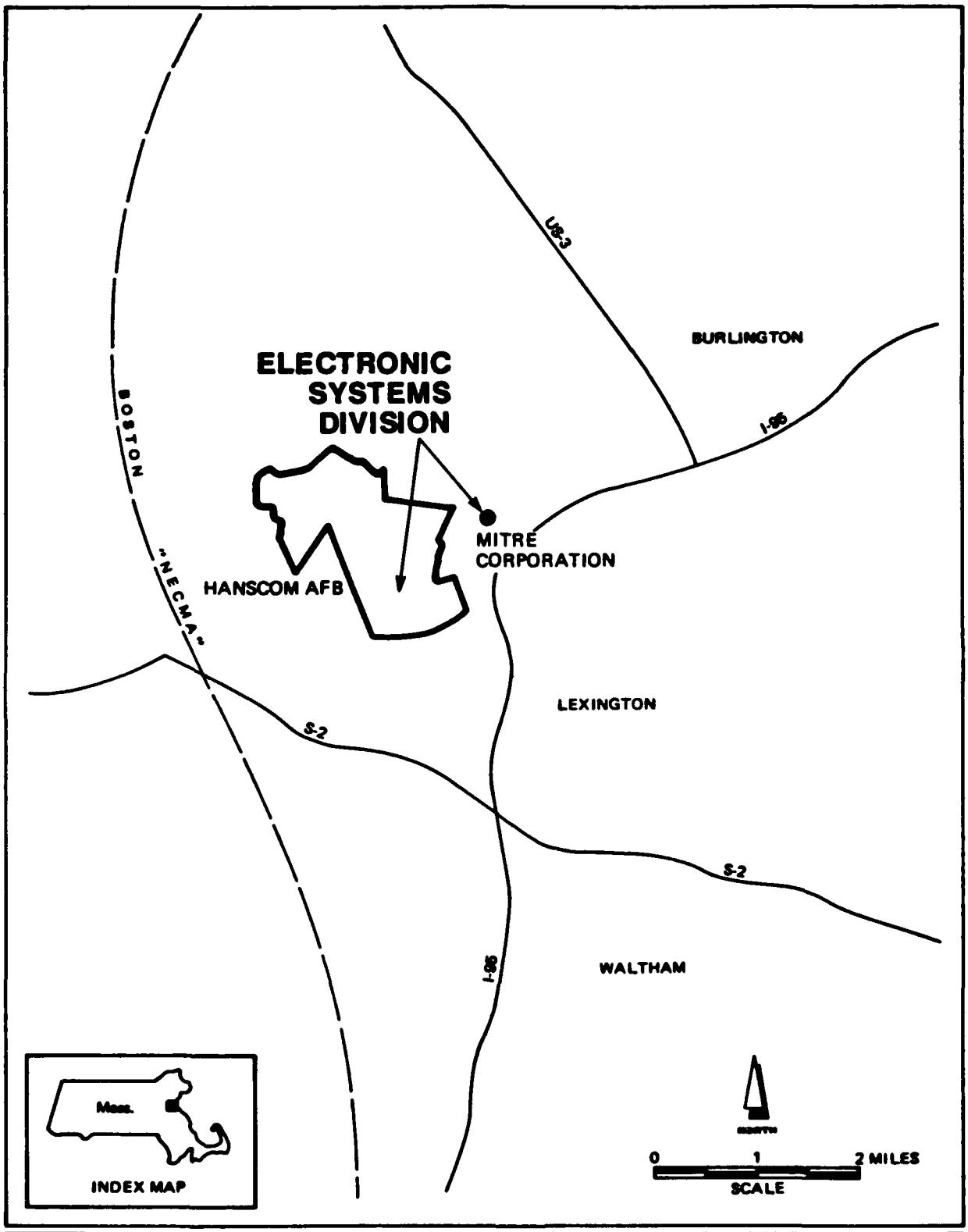
				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	1,500 kW service, supplied by Huntsville Utilities	62
		SOLID WASTE	Service supplied by BFI Corporation	62
		SEWAGE TREATMENT	Service supplied by Huntsville Utilities	62
		TRANS-PORTATION	Access from U.S. 72 and Hwy. 20 (currently being connected with I-565); traffic gets heavy at rush hour times but keeps moving	62
		WATER SUPPLY	Supplied by Huntsville Utilities, considered sufficient; closed cooling system.	62
PERMIT STATUS		AIR	No permits required for current building use or future operations.	63
		WASTE WATER	No permits required for current building use or future operations.	63
		HAZARDOUS WASTE	No permits required for current building use or future operations..	63
ADDITIONAL ENVIRONMENTAL INFORMATION	No Environmental Assessment available for building.			63
COMMENTS	The Advanced Research Center recently occupied a new facility, which is leased, privately owned building. There are no current figures for electricity, sewage, solid waste, and water usage.			62

TABLE 2-2.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ADVANCED RESEARCH CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Madison County					
Population	186,540	196,966	210,020	0.55	1.62
Year-Round Housing	56,801	71,040	N/A	1.91	N/A
Vacancy Rate (%)	6.4	5.6	N/A	--	--
Civilian Labor Force	70,481	90,214	117,779	2.50	6.89
Unemployment (%)	4.4	7.9	7.1	--	--
Per Capita Income ($)[1]	3,132	7,050	9,570	--	--
Median Family Income ($)[1]	10,437	19,350	N/A	--	--
Huntsville					
Population	139,282	142,513	149,527	0.23	1.21
Year-Round Housing	43,605	53,246	N/A	2.02	N/A
Vacancy Rate (%)	6.5	5.3	N/A	--	--
Civilian Labor Force	54,045	68,164	85,028	2.35	5.68
Unemployment (%)	4.3	7.6	7.1	--	--
Per Capita Income ($)[1] 2,985	3,502	7,661	10,714	--	--
Median Family Income ($)[1]	11,651	20,920	N/A	--	--

References: 47, 48, 49, 51, 57

[1] Income figures refer to preceding year



LOCATION MAP OF ELECTRONIC SYSTEMS DIVISION AT HANSCOM AFB, MASSACHUSETTS

FIGURE 2-2

Division (4). A description of the facility and its environment is presented in Table 2-3.

The facility's functions are mainly administrative activities in research and development in terrestrial, atmospheric, and space environments. The Electronic Systems Division is responsible for developing, acquiring, and delivering electronic systems and equipment for the command, control, communications, and intelligence functions for aerospace forces (27).

For socioeconomic purposes, the supporting region for this facility is defined as the Boston, New England Consolidated Metropolitan Area. Table 2-4 contains selected socioeconomic data for this area.

Based on available data, Hanscom Air Force Base (including the Electronic Systems Division administration offices) and the MITRE Corporation facility are in compliance with Federal standards for air quality, water quality, and hazardous waste (5).

Environmental documentation has been prepared for Hanscom Air Force Base ("Installation Restoration Program, Phase IV-A, Hanscom Air Force Base, Area I, Environmental Assessment") (43).

2.3 NATIONAL TEST FACILITY

The National Test Facility will be constructed at Falcon Air Force Station (39). An interim facility will be operated out of the existing Consolidated Space Operations Center, also located at Falcon Air Force Station. This facility is in El Paso County, Colorado, about 12 miles east of Colorado Springs (Figure 2-3). The present mission of the Consolidated Space Operations Center is to provide support for military space operations through communications centralization and data link operations. The facility and its environmental characteristics are described in Table 2-5.

The Consolidated Space Operations Center was built to house two mission elements: the Satellite Operations Center and the Space Shuttle Operations Center (41). The former performs command, control, and communications service functions for orbiting spacecraft. The latter was to conduct DoD Shuttle flight planning, readiness, and control functions. The interim National Test Facility could be located at the Consolidated Space Operations Center because adequate support facilities are available (42).

For the purpose of socioeconomic assessment, the supporting region for this facility is defined as the surrounding El Paso County and the nearby community of Colorado Springs. Selected socioeconomic data for these areas are contained in Table 2-6.

Based on available data, the Falcon Air Force Station, including the Consolidated Space Operations Center and the proposed location of the National Test Facility, is in compliance with Federal standards for air quality, water quality, and hazardous waste. Environmental documentation has been prepared for both the National Test Facility (National Test Facility Environmental Assessment) (39) and the interim National Test Facility at the Consolidated Space Operations Center (Categorical Exclusion, control number AFSPC 86-1) (42).

TABLE 2-3
SELECTED ENVIRONMENTAL CHARACTERISTICS
ELECTRONIC SYSTEMS DIVISION

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	Administrative offices located on Hanscom Air Force Base (846 acres). Computers housed in MITRE Corporation office building (69,154 sq ft.), 1/2 mile from base.	4, 24, 66
		BASE FACILITIES	Facilities at Hanscom Air Force Base include electronic research and development laboratories, administration buildings, recreation area, housing; no flying missions; Computer system located in MITRE Corp. building	4, 24, 66
		TEST FACILITIES	Research and development in terrestrial, atmospheric, and space environments, early warning systems, satellite tracking, radar, computer communication systems	4, 13, 24
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Hanscom AFB and the MITRE Corporation building are located in a suburban area with no natural resource development.	4, 14
		VISUAL RESOURCES	Facilities are located approximately 17 miles from Boston, in a level tree-lined surburban/industrial area. The MITRE Corp. building is a single-story brick building.	4, 5, 24
		SPECIAL STATUS	No endangered species or special habitat; no known cultural resources.	4, 14
		NOISE	Both Hanscom AFB and the MITRE Corp. building comply with current noise regulations.	4, 13
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Hanscom Air Force Base: Civilian = 3,100; Military = 2,100 (1987) MITRE Corp. building: Electronic Systems Division employees = 75; MITRE Corp. employees in support of the Electronic Systems Division = 75-125	4, 23
		PAYROLL	$160 million (1987, for Hanscom Air Force Base)	23
		HOUSING	Officer = 387; NCO = 472; Transient = 784 (1987, for Hanscom Air Force Base)	23

TABLE 2-3 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
ELECTRONIC SYSTEMS DIVISION

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand: 16,900 kW; Peak daily capacity: 20,217 kW (for Hanscom Air Force Base). Boston Edison Power will supply the MITRE Corp. building with 277/480 volt service	4, 13
		SOLID WASTE	Volume = 179 tons/month diposed of in offsite landfills by contractor, M.J. Connelly Co. Reliable Rubbish Co. will serivce the MITRE Corp. building.	4, 13, 20
		SEWAGE TREATMENT	Sewage treatment for both Hanscom Air Force Base and the Mitre Corp. building provided by the Massachusetts Waste Resource Authority; average use for Hanscom Air Force Base is 1 million gallons/day.	13, 29, 35
		TRANS-PORTATION	City streets and Interstate 95 (about one mile away) access facility Currently suffers from local congestion at rush hours.	5, 13, 34
		WATER SUPPLY	At Hanscom Air Force Base the water supply daily demand is one million gallons/day. All water comes from Quabbin Reservoir, by way of Lexington. The MITRE Corporation building is serviced by the Massachusetts Water Resource Authority.	5, 13, 14
PERMIT STATUS		AIR	Attainment area; no PSD permits required for current building use and future operations.	5, 13
		WASTE WATER	At Hanscom Air Force Base an NPDES permit is in place with no currrent violations. No permits required for the MITRE Corp. building operations.	5, 13
		HAZARDOUS WASTE	At Hanscom Air Force Base the waste is taken offbase; no permits exist. No permits required for the MITRE Corp. building operations.	5, 13
ADDITIONAL ENVIRONMENTAL INFORMATION	At Hanscom Air Force Base the current base Master Plan will be updated in July 1987. Two additions to the Electronic Systems Division Building on Hanscom Air Force Base are covered by Categorical Exclusion. Most recent EA: Installation Restoration Program, Phase IV-A, Hanscom Air Force Base, Area 1, Environmental Assessment. Environmental Assessment, 164 family housing units, 1986. No environmental documentation for the MITRE Corp. building available.			5, 14, 15
COMMENTS	The equipment and staff which will be housed in the MITRE Corporation building (32 Hartwell Rd) by August 1987, are currently located at MITRE Corp. building D.			66

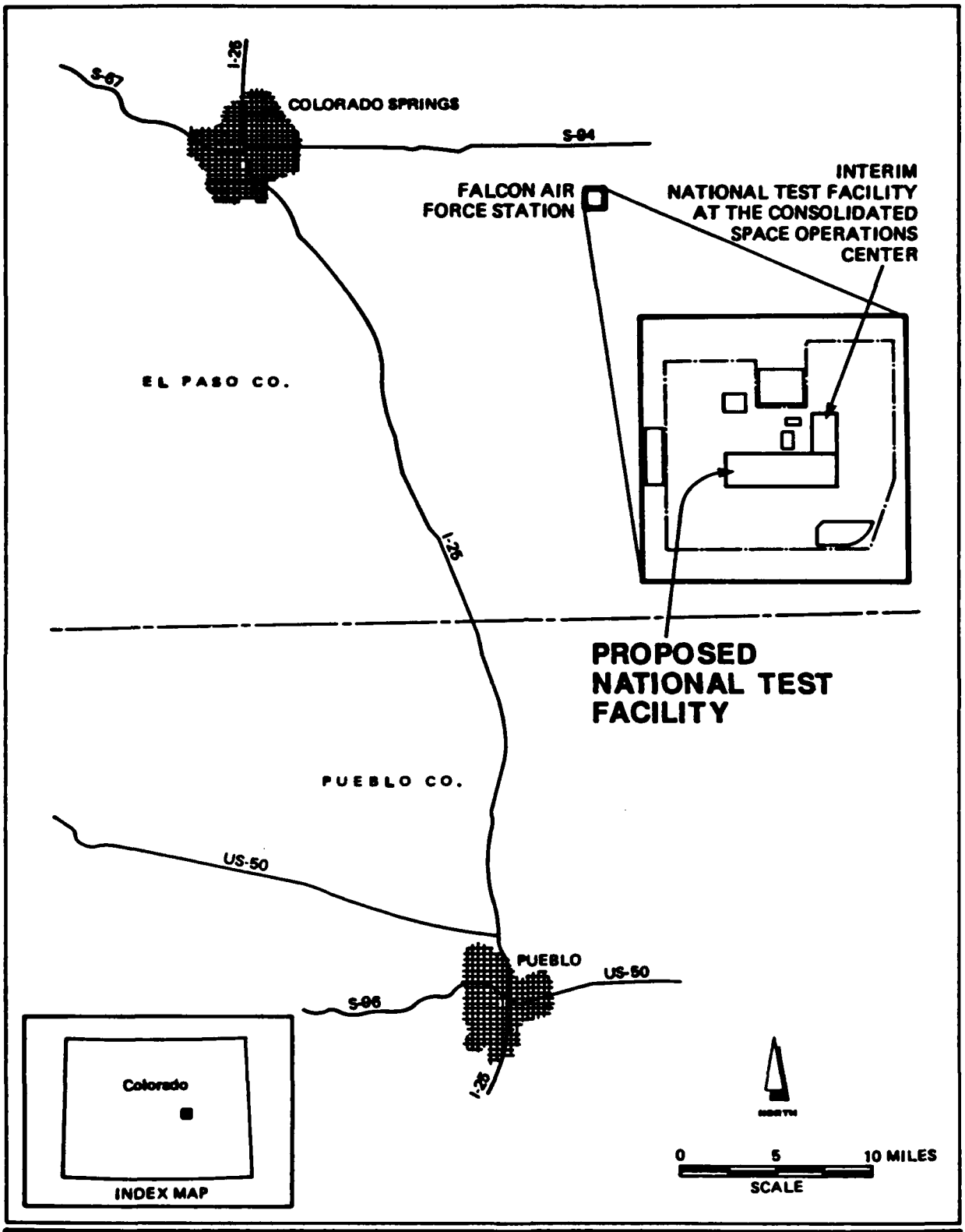
TABLE 2-4.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ELECTRONIC SYSTEMS DIVISION

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Boston NECMA					
Population	3,709,642	3,662,888	N/A	-0.13	N/A
Year-Round Housing	N/A	1,359,411	N/A	N/A	N/A
Vacancy Rate (%)	N/A	4.6	N/A	--	--
Civilian Labor Force	N/A	1,863,000[2]	N/A	N/A	N/A
Unemployment (%)	N/A	5.3	N/A	--	--
Per Capita Income ($)[1]	N/A	10,805	N/A	--	--
Median Family Income ($)[1]	N/A	22,286	N/A	--	--

Reference: 53

[1] Income figures refer to preceding year

[2] Rounded to nearest 1000



LOCATION MAP OF NATIONAL TEST FACILITY AT FALCON AFS, COLORADO

FIGURE 2-3

TABLE 2-5
SELECTED ENVIRONMENTAL CHARACTERISTICS
NATIONAL TEST FACILITY

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	640 acres	3
		BASE FACILITIES	Administrative offices, communications network	39
		TEST FACILITIES	Advanced communications network capabilities	39
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	None on facility	11
		VISUAL RESOURCES	Region consists of gently rolling plains characterized by semiarid grasslands used for agricultural grazing; Falcon Air Force Station is considered developed, as high-technology buildings and support facilities dominate the landscape.	39
		SPECIAL STATUS	None on facility	11
		NOISE	Current ambient noise level is 40 L_{dn}, which is below acceptable limits.	10
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Military = 895, Active Duty; Civilian = 2,088 (1987, at Falcon Air Force Station)	23
		PAYROLL	$0.9 Million (1987; Civilian payroll, at Falcon Air Force Station)	23, 59
		HOUSING	Officer = 106; NCO = 384; Transient = 130; (1987; at Peterson Air Force Base, no known housing at Falcon Air Force Station)	23

TABLE 2-5 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
NATIONAL TEST FACILITY

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 6,100 kWh for Consolidated Space Operations Center; Capacity = 15,000 kW; can be expanded to 25,000 kW	39
		SOLID WASTE	Disposed offsite at licensed landfill by private contractor	10
		SEWAGE TREATMENT	Design capacity = 0.069 million gallons/day; designed to support 2,300 Base personnel	39
		TRANS-PORTATION	Access to Falcon AFS provided by State Highway 94 and Enoch Road. Current traffic at Enoch Road = 1,550 vehicles/day, capacity 11,300 vehicles/day. Current traffic at SH 94 = 3,500 vehicles/day, capacity 16,000 vehicles/day.	39
		WATER SUPPLY	The Cherokee Water District contract with Falcon Air Force Station limits delivery of water to 0.479 million gallons per day. Existing peak water demands at the installation are estimated at 0.409 million gallons per day.	39
PERMIT STATUS		AIR	Attainment by Colorado standards (Falcon AFS is located outside the Colorado Springs non-attainment areas for carbon monoxide and total suspended particulates)	10
		WASTE WATER	NPDES Permit is in place for wastewater that is discharged offbase into lagoons.	10
		HAZARDOUS WASTE	Potential Hazardous Wastes: electrolytes, sodium hydroxide, sodium sulphide, dichlorodiflouromethane, sulfur dioxide, SSP-55 all in very small amounts; offsite disposal by Defense Reutilization Management Office	10, 12
ADDITIONAL ENVIRONMENTAL INFORMATION	No environmental compliance plan available. The Base Master Plan is being developed and is expected to be completed in June 1988; there are no land use or zoning conflict issues. Current EA: National Test Bed Program, 1987; Final Environmental Impact Statement, Consolidated Space Operations Center, January, 1981			11, 39
COMMENTS	National Test Facility has categorical exclusion as stated in document 813 (control # AFSPC 86-1) dated 8-12-86. Data is for Falcon Air Force Station, unless otherwise noted.			42, 65

TABLE 2-6.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
NATIONAL TEST FACILITY

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
El Paso County					
Population	235,972	309,424	349,066	2.75	3.06
Year-Round Housing	72,913	116,770	N/A	4.82	N/A
Vacancy Rate (%)	7.3	7.7	N/A	--	--
Civilian Labor Force	71,085	130,297	163,883	6.25	5.90
Unemployment (%)	5.5	7.6	5.4	--	--
Per Capita Income($)[1]	2,920	7,027	9,812	--	--
Median Family Income ($)[1]	8,974	18,729	N/A	--	--
Colorado Springs					
Population	140,512	215,105	247,739	4.35	3.59
Year-Round Housing	46,502	88,189	N/A	6.61	N/A
Vacancy Rate (%)	7.7	7.9	N/A	--	--
Civilian Labor Force	46,414	98,140	123,504	7.78	5.92
Unemployment (%)	5.7	7.4	5.3	--	--
Per Capita Income ($)[1]	3,001	7,404	10,292	--	--
Median Family Income ($)[1]	9,089	18,987	N/A	--	--

References: 47, 48, 49, 52, 57

[1] Income figures refer to preceding year

2.4 ROME AIR DEVELOPMENT CENTER

Rome Air Development Center is located at Griffiss Air Force Base, 1 mile northeast of Rome, New York (Figure 2-4). The facility is the principal organization for U.S. Air Force research and development programs related to command, control, communications, and intelligence. Missions include communications, surveillance, intelligence data handling, information systems technology, artificial intelligence, and guidance and control of weapons systems (24, 40). Rome Air Development Center performs research and development pertaining to the electromagnetic survivability of command, control, communications, and intelligence systems, as well as the reliability, compatibility, and maintainability of electronic systems (40). A description of the facility and its environment is presented in Table 2-7.

For socioeconomic purposes, the supporting region for this facility is defined as the surrounding Oneida County, which includes the communities of Rome and Utica. Selected socioeconomic data for these areas are contained in Table 2-8.

Based on available data, Rome Air Development Center is in compliance with Federal standards for air quality, water quality, and hazardous waste (6). Environmental documentation for the facility is prepared as needed on an individual basis (28).

2.5 NEVADA TEST SITE

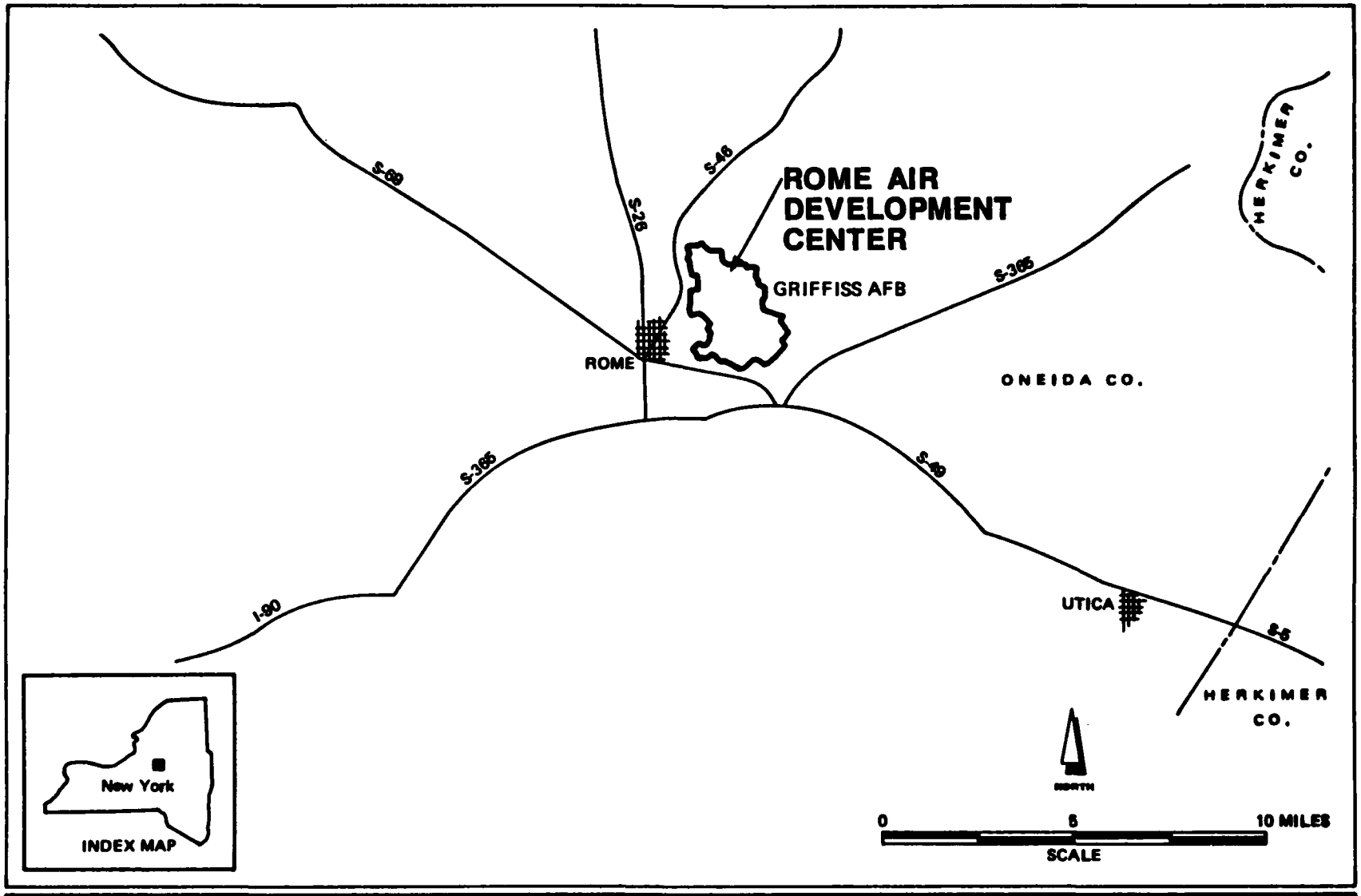
The Nevada Test Site is located adjacent to the Nellis Air Force Range approximately 65 miles northwest of Las Vegas in southeastern Nye County, Nevada (61) (Figure 2-5). The Nevada Test Site, 864,000 acres in size, operates facilities for underground testing of nuclear devices and weapons testing. Exposure of materials and components to nuclear radiation is often an integral part of a nuclear test. A description of the facility and its environment is presented in Table 2-9.

For purposes of socioeconomic assessment, the supporting region for the Nevada Test Site is defined as Nye County, where the facility itself is located, as well as Clark County and its main population center, Las Vegas, located to the southeast. Selected socioeconomic data for these areas are presented in Table 2-10.

Based on available data, the Nevada Test Site is in compliance with Federal standards for air quality, water quality, and hazardous waste (55, 64). Environmental documentation has been prepared for the Nevada Test Site (Final Environmental Impact Statement, ERDA-155, September 1977) (18).

2.6 HARRY DIAMOND LABORATORIES

The central Harry Diamond Laboratories are located in Adelphi, Prince Georges County, Maryland, about 5 miles from Washington, D.C. (Figure 2-6). Harry Diamond Laboratories also operate a facility near Woodbridge, Virginia (the Woodbridge Research Facility). One of the principal functions of Harry Diamond Laboratories is electronic research and development in simulating



LOCATION MAP OF ROME AIR DEVELOPMENT CENTER AT GRIFFISS AFB, NEW YORK

FIGURE 2-4

TABLE 2-7
SELECTED ENVIRONMENTAL CHARACTERISTICS
ROME AIR DEVELOPMENT CENTER

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	3,896 acres	3
		BASE FACILITIES	Administration and laboratory buildings which house Rome Air Development Center, 70-bed hospital, air field, PX, theaters, church, recreational facilities; home of 24th Air Division and a tank squadron	3
		TEST FACILITIES	Research and development for Command, Control, Communications, and Intelligence; communications, surveillance, intelligence data handling; information system technology; artificial intelligence (for Rome Air Development Center)	3
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	No natural resources development on base.	8
		VISUAL RESOURCES	Located within an area of generally flat topography with no dominant hills and with small towns, agriculture, and woodland within 1 mile.	22, 32
		SPECIAL STATUS	The Gingseng & the Globe Flower are federally listed threatened and endangered plant species; the Indiana Bat, the Bald Eagle, and the Artic Peregrine Falcon are federally listed threatened and endangered animals. No known cultural resources.	8, 22
		NOISE	Community development is limited to areas of low noise and safety impacts as defined by the Air Installation Compatible Use Zones (AICUZ). Predominant noise sources are aircraft activity, offbase traffic, neighborhood activities, and wind in the trees. Maximum noise range due to aircraft is 60-85 L_{dn} onbase.	6, 22
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Civilian = 3,204 Military = 4,523 (1987, for Griffiss Air Force Base)	23
		PAYROLL	$267.0 million (1987, for Griffiss Air Force Base)	23
		HOUSING	Officer = 169 NCO = 566 Transient = 109 (1987, for Griffiss Air Force Base	23

TABLE 2-7 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
ROME AIR DEVELOPMENT CENTER

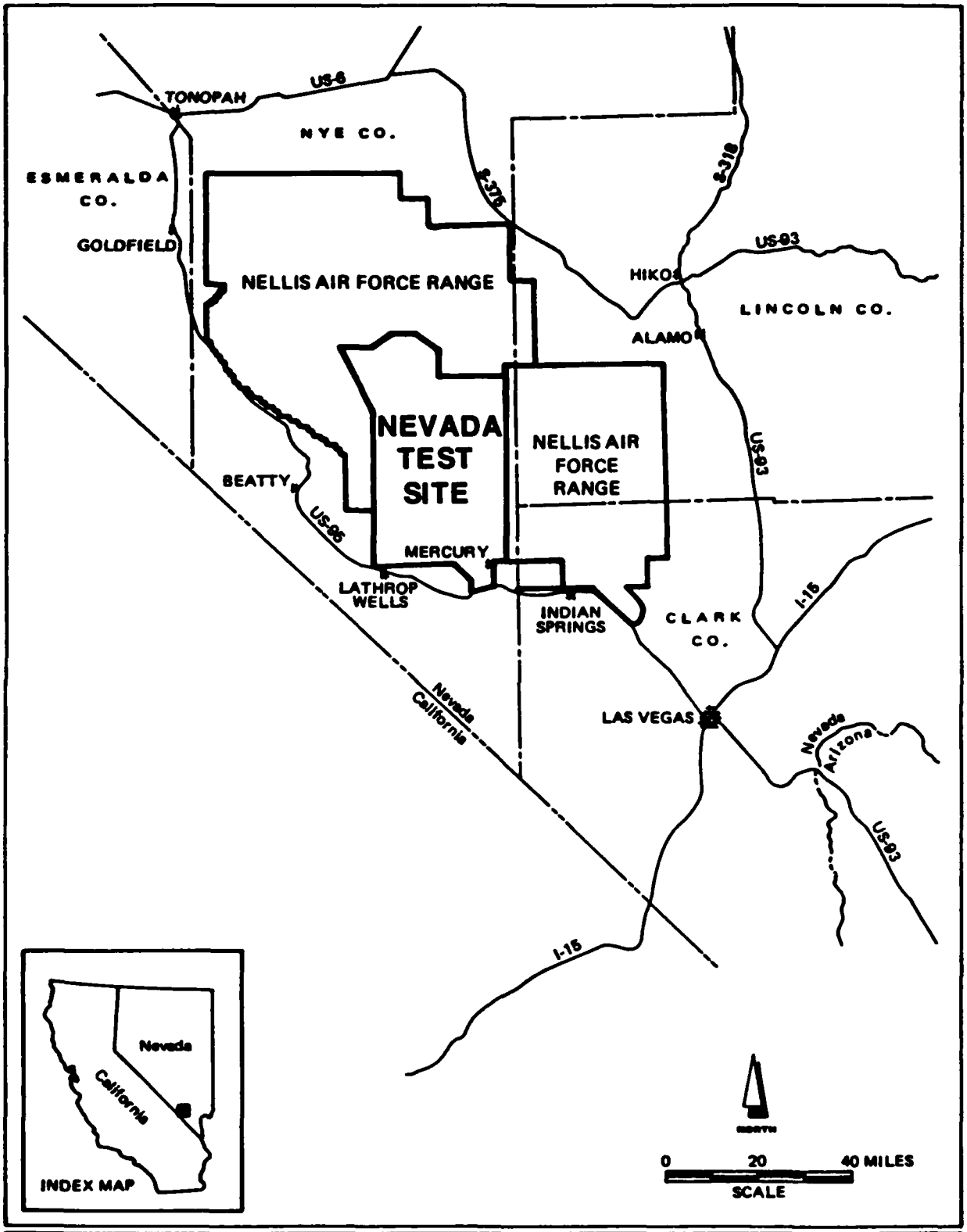
				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 217,000 kWh Peak daily capacity = 15,000 kW	7
		SOLID WASTE	Volume = 146,000 cubic yards, carried offbase by contractor to county facility. Small solid waste disposal area is in operation but is used only for disposal of construction operation and maintenance waste.	6, 7, 22
		SEWAGE TREATMENT	Sent offsite to City of Rome Sewer Authority, Rome, New York. Base equals 5% of total input into system.	6, 8
		TRANS-PORTATION	5 roads access area, high-volume capacity/low-volume use; one railroad with heavy freight capacity runs once a month	6, 8
		WATER SUPPLY	Demand = 1.06 million gallons/day Capacity = 18.72 million gallons/day	7, 38
PERMIT STATUS		AIR	In attainment area Air Shed classification is estimated at II. Air emissions are in compliance with existing permit requirements.	6, 7
		WASTE WATER	Base has several NPDES permits with no violations.	6
		HAZARDOUS WASTE	No facility on base, but one currently in planning stage, currently waste is shipped offsite.	6, 7
ADDITIONAL ENVIRONMENTAL INFORMATION			Most recent EA for Central Heat Plant Project, Griffiss AFB, New York, September 1981. No specific environmental document exists for the Rome Air Development Center. No environmental compliance plan available. Base Master Plan is being developed, existing plan is 10 years old.	8, 22, 28
COMMENTS			Rome Air Development Center is located on Griffiss AFB. Data derived is for Griffiss AFB unless otherwise noted. Facilities to be used for BM/C^3 already exist with the exception of a 20 x 50-foot annex that will be added to contain a small cryogenic chamber. Environmental documentation for addition has been prepared.	31, 37

TABLE 2-8.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ROME AIR DEVELOPMENT CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Oneida County					
Population	273,070	253,466	253,905	-0.74	0.04
Year-Round Housing	86,311	93,265	N/A	0.78	N/A
Vacancy Rate (%)	4.9	5.6	N/A	--	--
Civilian Labor Force	104,153	106,829	103,665	0.25	-0.75
Unemployment (%)	5.8	8.2	6.9	--	--
Per Capita Income ($)[1]	2,941	6,148	8,285	--	--
Median Family Income ($)[1]	9,808	18,174	N/A	--	--
Rome					
Population	50,148	43,826	43,665	-1.34	-0.09
Year-Round Housing	14,515	15,789	N/A	0.84	N/A
Vacancy Rate (%)	3.3	3.9	N/A	--	--
Civilian Labor Force	16,030	16,268	15,740	0.15	-0.82
Unemployment (%)	6.4	9.9	8.3	--	--
Per Capita Income ($)[1]	2,796	5,976	7,904	--	--
Median Family Income ($)[1]	9,184	16,961	N/A	--	--
Utica					
Population	91,373	75,632	72,935	-1.87	-0.90
Year-Round Housing	32,743	31,750	N/A	-0.31	N/A
Vacancy Rate (%)	5.1	9.0	N/A	--	--
Civilian Labor Force	37,657	31,291	30,289	-1.83	-0.81
Unemployment (%)	6.6	9.6	8.1	--	--
Per Capita Income ($)[1]	2,855	5,592	7,629	--	--
Median Family Income ($)[1]	9,007	15,789	N/A	--	--

References: 47, 48, 49, 50, 57

[1] Income figures refer to preceding year



LOCATION MAP OF NEVADA TEST SITE, NEVADA

FIGURE 2-6

TABLE 2-9
SELECTED ENVIRONMENTAL CHARACTERISTICS
NEVADA TEST SITE

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	864,000 acres	61
		BASE FACILITIES	Dedicated to underground nuclear testing, development and testing of nuclear explosives for peaceful applications, and testing of weapons effects	25, 56
		TEST FACILITIES	Facilities for underground testing of nuclear devices and exposure of components to nuclear radiation	56, 61
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Low-grade uranium and geothermal resources are found in general area, but are not currently considered economical.	56
		VISUAL RESOURCES	Located in a desert area with gently rolling topography dissected by ephemeral streams; landscape has been affected by underground blasting.	56
		SPECIAL STATUS	No federally listed threatened or endangered species listed; however, there are several candidate species. Archaeological and historical sites have been identified, but none are listed on the National Register of Historical Places.	18, 55, 56
		NOISE	Uninhabited desert, intermittent short duration noise from onsite tests	18
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Approximately 8,000, mostly civilians	61
		PAYROLL	Data not available	
		HOUSING	Limited housing onsite	61

TABLE 2-9 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
NEVADA TEST SITE

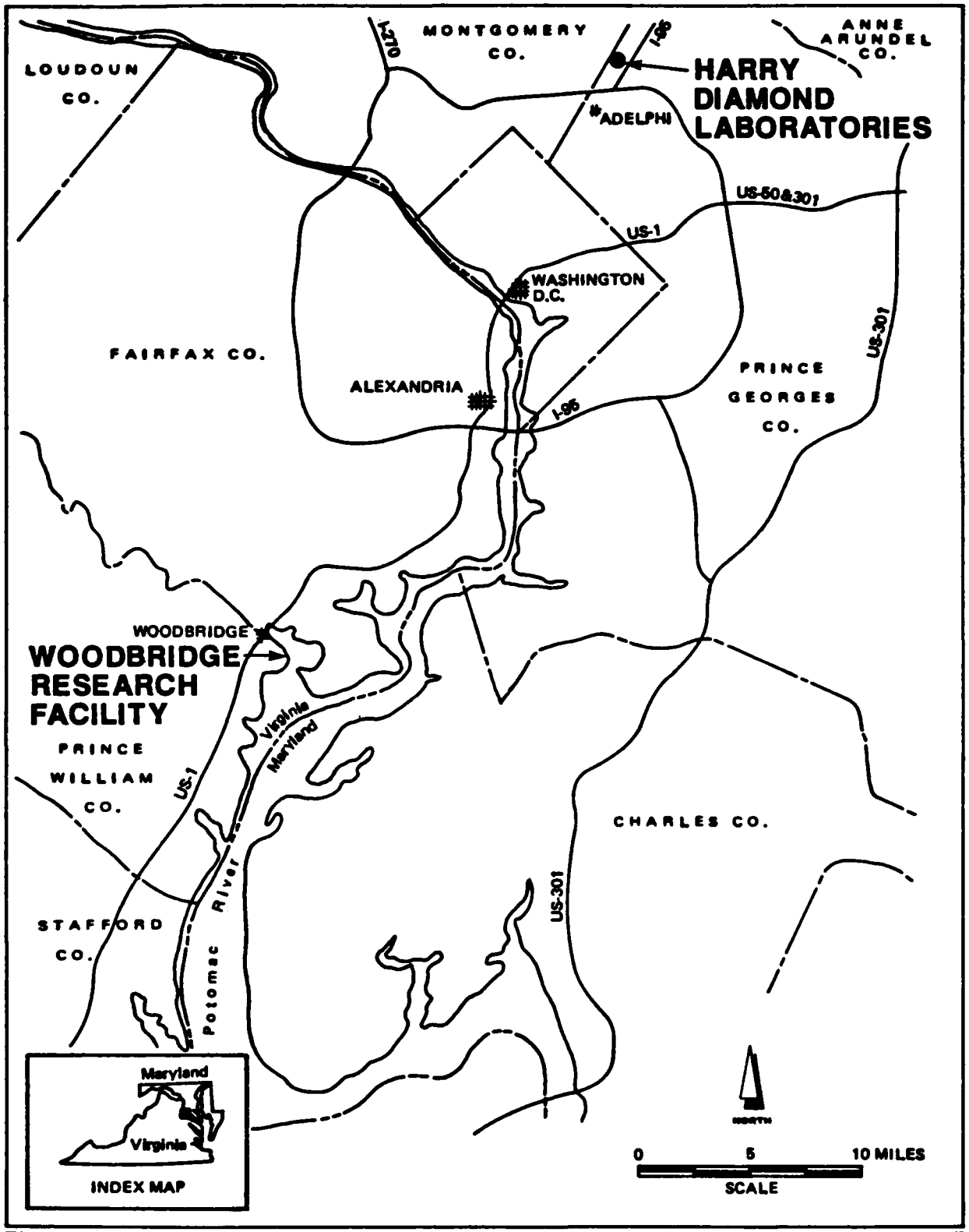
				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily load = 37 MW; will need to upgrade capacity in the next 4-5 years	64
		SOLID WASTE	Permitted disposal onsite	64
		SEWAGE TREATMENT	Currently three ponds in use	64
		TRANS-PORTATION	700 miles of road onsite, 300 miles are paved. Funding for upgrading is available. Network is within capacity.	64
		WATER SUPPLY	Demand = 1.2 million gallons/day; capacity = 2.4 million gallons/day; supplied by 17 onsite wells.	55
PERMIT STATUS		AIR	Within attainment of all National Ambient Air Quality Standards	55
		WASTE WATER	No release of effluent to streams; no permits	55, 64
		HAZARDOUS WASTE	TSD facility with RCRA Part B permit to handle new wastes	55
ADDITIONAL ENVIRONMENTAL INFORMATION	Final Environmental Impact Statement, Nuclear Test Site, ERDA-155, September 1977			18
COMMENTS	Underground testing is conducted in the Pahute Mesa, Ranier Mesa, Yucca Flat, and Frenchman Flat areas of Nevada Test Site.			18

TABLE 2-10.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
NEVADA TEST SITE

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Nye County					
Population	5,599	9,048	14,434	4.92	12.39
Year-Round Housing	2,093	4,202	N/A	7.22	N/A
Vacancy Rate (%)	13.4	18.3	N/A	--	--
Civilian Labor Force	2,465	4,330	3,659	5.80	-4.12
Unemployment (%)	2.8	4.7	6.3	--	--
Per Capita Income ($)[1]	3,844	7,169	8,889	--	--
Median Family Income ($)[1]	10,218	19,914	N/A	--	--
Clark County					
Population	273,288	463,087	536,473	5.42	3.75
Year-Round Housing	92,815	189,860	N/A	7.42	N/A
Vacancy Rate (%)	5.5	8.4	N/A	--	--
Civilian Labor Force	113,669	240,320	279,180	7.77	3.82
Unemployment (%)	5.2	6.4	8.6	--	--
Per Capita Income ($)[1]	3,538	8,259	9,930	--	--
Median Family Income ($)[1]	10,865	21,029	N/A	--	--
Las Vegas					
Population	125,787	164,674	183,227	2.73	2.70
Year-Round Housing	43,028	67,041	N/A	4.53	N/A
Vacancy Rate (%)	5.0	7.3	N/A	--	--
Civilian Labor Force	54,500	86,114	100,136	4.68	3.84
Unemployment (%)	5.6	6.7	9.0	--	--
Per Capita Income ($)[1]	3,614	8,135	9,795	--	--
Median Family Income ($)[1]	11,338	21,028	N/A	--	--

References: 47, 48, 49, 52, 57

[1] Income figures refer to preceding year



LOCATION MAP OF HARRY DIAMOND LABORATORIES, MARYLAND AND VIRGINIA

FIGURE 2-6

nuclear effects to test nuclear hardening of materials. They have specialized facilities to test radiation effects in the Aurora Facility at Adelphi and to test the survivability of material subjected to electromagnetic pulse at the Woodbridge Research Facility. A description of the facilities at Harry Diamond Laboratories is provided in Table 2-11.

The radiation chamber at the Aurora Facility simulates gamma radiation with a non-radioactive source to evaluate the transient radiation effect on electronics (1). This type of testing takes between 3 days and 2 months, but on the average requires 2 weeks, including preparation, testing, and post-test procedures (1). Harry Diamond Laboratories has a small staff dedicated to this type of testing, which takes place year-round on a schedule that is booked years in advance (1).

The electromagnetic pulse test facility at the Woodbridge Research Facility simulates the effects of an electromagnetic pulse that would be created by a nuclear blast (46). The effectiveness of hardening techniques is tested at the Woodbridge Research Facility. Testing in the five electromagnetic pulse simulators is ongoing on a daily basis and the staff at the Woodbridge Research Facility is dedicated to the testing activities (33).

For the purpose of socioeconomic assessment, the supporting region for this facility is defined as the Washington, D.C., Metropolitan Statistical Area. Selected socioeconomic data for this area are contained in Table 2-12.

Based on available data, Harry Diamond Laboratories at Adelphi, including the Aurora Facility, are in compliance with Federal standards for air quality and hazardous waste. The Adelphi site is generally in compliance with water quality standards, except during heavy rains that cause the water table to rise (20). The Woodbridge Research Facility is in compliance for air quality, water quality, and hazardous waste.

Environmental documentation has been prepared for Harry Diamond Laboratories, Adelphi site ("Installation Assessment", 1981; "Analyses of Existing Facilities/Environmental Assessment", 1980) (19, 44).

Electromagnetic pulse test facilities are the subject of a civil action (Civil Action No. 87-0642, Foundation on Economic Trends, et al., Plaintiffs, v. Caspar W. Weinberger) for failure to provide adequate and required National Environmental Policy Act environmental documentation on their electromagnetic pulse program (58). The staff at Harry Diamond Laboratories are currently in the process of preparing the required site-specific environmental documentation (26).

TABLE 2-11
SELECTED ENVIRONMENTAL CHARACTERISTICS
HARRY DIAMOND LABORATORIES

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	Adelphi: 137 acres Woodbridge: 579 acres	20, 44, 45
		BASE FACILITIES	Adelphi: Admin. bldgs., circuit board lab, machine shop, explosive handling, storage and processing bldg., cobalt 60 bldg., world's largest x-ray facility Woodbridge: Electromagnetic pulse tester, disassembly bldg., 5 main admin. bldgs., 5 small bldgs.	1, 20, 44, 45
		TEST FACILITIES	Adelphi: X-ray facility (can hold Army tank), radiation testing, nuclear hardening test Woodbridge: Nuclear hardening tests	20, 44, 45
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Adelphi: Timber, natural trout stream (Paint Branch Creek) Woodbridge: Timber	20
		VISUAL RESOURCES	Adelphi: Forested, rural setting in suburban housing development. Woodbridge: Gentle rolling hills with one timber stand, on peninsula surrounded by Marumsco Creek and the Potomac River; antenna platforms create a visual impact on the horizon--they cannot be screened.	20, 44, 45
		SPECIAL STATUS	Adelphi: No known threatened or endangered species or cultural resources on facility. Woodbridge: No known threatened and endangered species on facility, Bald Eagle sighted, wildlife refuge borders north side of facility. Approximately 150 acres classified as wetlands, tidal marsh, and/or swamp. One recorded state historical site (graveyard).	20, 44, 45
		NOISE	No noise impacts in any of the sites. Woodbridge site has a minimum 200 foot buffer zone.	20, 45
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	40 military, 1,797 civilian	33
		PAYROLL	$53 million	33
		HOUSING	Adelphi: None on facility; Woodbridge: Nine family housing units that are owned by Ft. Belvoir	33, 44, 45

TABLE 2-11 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
HARRY DIAMOND LABORATORIES

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Adelphi: Current demand = 6,900 kW, Current capacity = 22,400 kW, service supplied by the Potomac Electric Power Company and six standby generators. Woodbridge: Current demand = 366 kW, Current capacity = 10,000 kW	2, 20, 44, 45
		SOLID WASTE	Adelphi: Disposed offsite by contractor. Woodbridge: Disposed offsite through private contractor.	20, 44, 45
		SEWAGE TREATMENT	Adelphi: Current use = 120,000 gallons/day. Washington Suburban Sanitary Commission restricts volume received to maximum total average daily volume of 60,000 gallons: peak daily volume not to exceed twice that amount. 100,000 gallon storage tank on facility prevents exceedances. Woodbridge: Service supplied by Occoquan Woodbridge Sanitary District. Current demand does not exceed capacity.	20, 21, 44, 45
		TRANS-PORTATION	Adelphi: Two road entrances to facility, traffic becomes heavy at shift times. Woodbridge: Rural roads, no traffic; railroad could block emergency road route.	20, 44, 45
		WATER SUPPLY	Adelphi: Current use is 120,000 gallons/day. Water is purchased from the Washington Suburban Sanitary Commission, which does not guarantee the delivery of any specific pressure or quantity of water to the facility; no problems with water supply since 1973. Woodbridge: Supplied by Occoquan Woodbridge Sanitary District	20, 45
PERMIT STATUS		AIR	Adelphi: Five current air permits for smoke stacks from the boiler plants; permits only enacted when burning No. 2 heating oil; State controlled, no violations. Woodbridge: No air permits required for facility.	20
		WASTE WATER	Adelphi: Have one NPDES permit for oil/water interceptor; has compliance problems with heavy rains due to water table rise. Woodbridge: No NPDES permits.	20
		HAZARDOUS WASTE	Adelphi: Has a hazardous waste storage facility with Part A on file. Part B was submitted 3 years ago, still pending. Wastes currently controlled by an open-ended consent order. Woodbridge: No hazardous waste.	20
ADDITIONAL ENVIRONMENTAL INFORMATION	Analyses of Existing Facilities/Environmental Assessment: Harry Diamond Laboratories, Adelphi; Woodbridge Research Facility. Final EIS, Formation of U.S. Army Electronic Research and Development Command, August 1976			44, 45
COMMENTS	- Fire protection water hydrant system is inadequate at Woodbridge; may be subject to water pressure fluctuation problems at Adelphi site; - The Foundation on Economic Trends has filed suit on DoD for inadequate NEPA documentation for the Electromagnetic Pulse Tester; Harry Diamond Laboratories currently in process of upgrading documentation.			1, 20, 44, 45

TABLE 2-12.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
HARRY DIAMOND LABORATORIES

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Washington, D.C. Metropolitan Statistical Area					
Population	3,040,307	3,250,489	3,249,400	0.67	-0.01
Year-Round Housing	N/A	1,244,915	N/A	N/A	N/A
Vacancy Rate (%)	N/A	5.8	N/A	--	--
Civilian Labor Force	N/A	1,752,000	N/A	N/A	N/A
Unemployment (%)	N/A	4.2	N/A	--	--
Per Capita Income ($)[1]	N/A	10,084	N/A	--	--
Median Family Income ($)[1]	N/A	27,404	N/A	--	--

References: 49, 53

[1] Income figures refer to preceding year

3. ENVIRONMENTAL CONSEQUENCES

This section assesses the potential environmental consequences of the proposed BM/C^3 Demonstration/Validation tests. It is based on a comparison of the tests described in Section 1, and the facilities to be utilized at proposed test locations, as described in Section 2. Any identified environmental documentation that addresses the types of activities proposed for the facilities is incorporated by reference.

Many of the tests from the BM/C^3 Demonstration/Validation program would be conducted at contractor facilities. The contractor has yet to be selected through the DoD procurement process. The selected contractor would be required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations. If the procurement process required a selected contractor to use Federal funds to conduct an activity with a potential for significant environmental consequences, an environmental analysis of the consequences of such activity would also be required of the contractor. This analysis would be utilized by DoD in completing an environmental assessment or environmental impact statement, as appropriate.

The approach used to complete the Environmental Assessment of the BM/C^3 Demonstration/Validation program was described in Section 1. To assess the potential for and the magnitude of impacts from Demonstration/Validation testing at each government facility, a two-step methodology was utilized (Figure 3-1). The first step was the application of assessment criteria to identify activities with no potential for significant environmental consequences. Activities were deemed to present no potential for significant environmental consequences if they met all of the following criteria (i.e., all "yes" answers):

1. Are the facility and its infrastructure adequate for the proposed activity (i.e., can the tests be conducted without new construction, excluding minor modifications)?

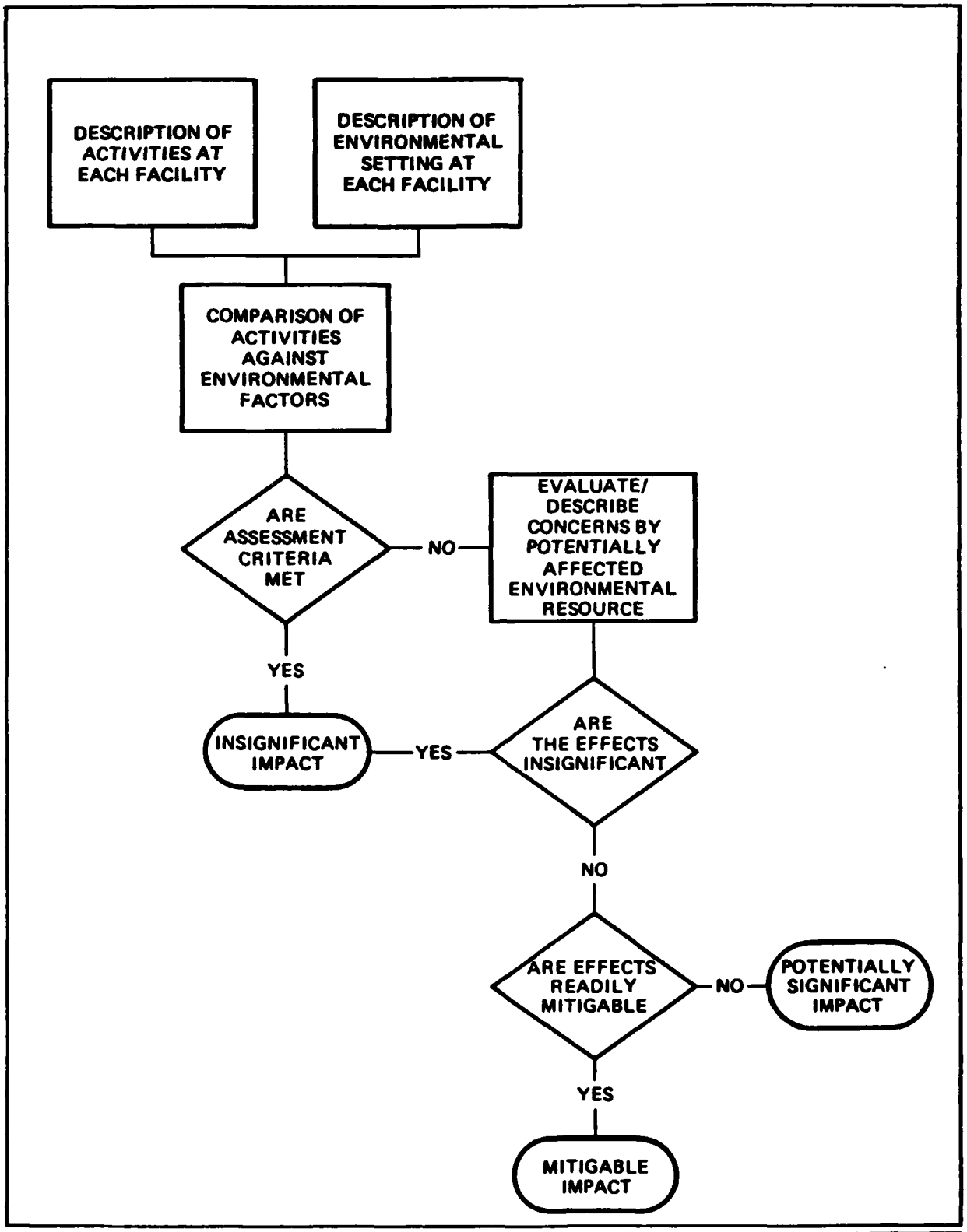
2. Is current staffing at the facility adequate to conduct the test, excluding minor staff level adjustments?

3. Does the facility comply with existing environmental standards?

4. Are the resources of the surrounding community adequate to accommodate the proposed testing?

If a proposed test was determined to present a potential for impact (i.e., a "no" answer to any of the above questions), the second step was to evaluate the activity in the context of the following environmental considerations: air quality, water quality, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be insignificant if, in the judgment of the analysts or as concluded in existing environmental documentation, no potential for significant environmental impacts exists. Consequences



METHOD FOR ASSESSING
POTENTIAL ENVIRONMENTAL CONSEQUENCES

FIGURE 3-1

were deemed mitigable if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious consequences exist that could not be readily mitigated, the activity was determined to represent potentially significant environmental impacts.

The remainder of this section provides discussions of the potential environmental consequences for each government location proposed for the BM/C^3 Demonstration/Validation program. The impacts of the no-action alternative and irreversible and irretrievable commitments of resources that would accompany BM/C^3 Demonstration/Validation are described at the end of this section.

3.1 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

3.1.1 Advanced Research Center

The BM/C^3 tests to be conducted at the Advanced Research Center would involve computer simulations for determining processing speeds, data base sizing, and memory requirements. The Advanced Research Center has recently leased a new privately owned building (17). BM/C^3 testing would use 23 existing computers at the facility and would require the addition of 5 to 6 new computers (36). The existing staff of 70 people would perform the required computer simulations (62). Existing infrastructure and facilities are deemed adequate for the proposed BM/C^3 tests. Based on available data, the Advanced Research Center has been determined to be in compliance with all existing environmental regulations (63). Thus, insignificant impacts are anticipated from BM/C^3 activities at the facility.

3.1.2 Electronic Systems Division

The BM/C^3 activities of the Electronic Systems Division would include administrative activities at Hanscom Air Force Base and analyses, simulations, and component/assembly testing using computers in the MITRE Corporation building. Approximately 75 Electronic Systems Division staff and 125 MITRE Corporation staff would be dedicated to BM/C^3 activities at the MITRE Corporation building (4). The BM/C^3 activities at the MITRE Corporation building and the Electronic Systems Division at Hanscom Air Force Base would not require additional facilities or infrastructure services (4, 5). Based on available data it has been determined that the Electronic Systems Division is in compliance with all existing environmental regulations (5). It is anticipated that the environmental impacts of BM/C^3 activities performed by the Electronic Systems Division would be insignificant.

3.1.3 National Test Facility

The National Test Facility would be used for analyses and simulations of BM/C^3 activities. The functions of the National Test Facility in the BM/C^3 tests are within the scope of the facility's design. Environmental effects of construction and operation of the National Test Facility are presented in the "National Test Facility Environmental Assessment" (39). This environmental assessment estimated that minor erosion during construction and minor impacts on air quality, ecology, groundwater supply, and vehicular traffic during

operation would occur. It concluded that with the implementation of proposed mitigation measures, no significant impacts are anticipated. Copies of this environmental assessment may be obtained from the Public Affairs Office at Falcon Air Force Station.

Until the National Test Facility is constructed, the staff necessary to complete the BM/C^3 tests would be located at existing facilities at Falcon Air Force Station. The environmental consequences of the proposed use of these existing facilities were addressed in a "Request for Environmental Impact Analysis," control number AFSPC 86-1 (42). The result of this request was an assessment that the interim National Test Facility qualified as a categorical exclusion in accordance with U.S. Air Force Categorical Exclusion 2x. This categorical exclusion states, "This is an administrative action utilizing interior space for personnel and computer equipment." Thus, no further environmental documentation is necessary. This categorical exclusion 2x refers to the Environmental Impact Statement for the Consolidated Space Operations Center (41). Copies of this document may be obtained from the Public Affairs Office at Falcon Air Force Station.

Operation of the National Test Facility would require a significant increase in the staff at Falcon Air Force Station. The previously completed "National Test Facility Environmental Assessment" (39) predicted the creation of approximately 2,300 permanent onsite jobs, as well as a daily average of 400 visitors (because each visit is likely to last a minimum of several days, visitors were counted as equivalent to employees). Including the visitors, the total maximum daily population would thus be increased by 2,700. On the assumption that only 10 percent of the daily population would be drawn from the local area, it was predicted that more than 2,400 families would relocate to the area. No estimates of the portion of the staffing specific to BM/C^3 have been made. While it can be assumed that only a portion of the total staffing is relevant to BM/C^3, the consequences of complete staffing are included as a worst-case analysis.

The result of applying the four assessment criteria against the test activities and the facility construction they would require shows the potential for environmental effects related to the construction of the National Test Facility, the proposed staffing requirements of the facility, and the resulting socioeconomic presence in surrounding communities. The assessment criteria for compliance with permits is met by the existing facilities. Thus, the results of the environmental assessment conducted for the National Test Facility are summarized below.

Air Quality

Current operations at Falcon Air Force Station are in attainment by Colorado standards. Once the National Test Facility is constructed, operations are predicted to add to an existing violation of the 1-hour and 8-hour carbon monoxide Federal standard from automobiles at the intersection of Petersen Boulevard and Highway 94 outside the base (39). This addition can be mitigated through the use of van pools and other conservation measures.

Water Quality

All discharges are in compliance with current permits (10). The environmental assessment for the National Test Facility predicts no significant impact on groundwater or surface water quality (39).

Biological Resources

No threatened or endangered species are identified in the vicinity of the National Test Facility (39). Impacts to biological resources were predicted to be insignificant (39).

Infrastructure

Evaluation of the effects on each of the infrastructure components is as follows:

- Electrical substation can be expanded to 25,000 kW with additional cooling equipment. The National Test Facility will require the addition of 13,000 kW, which could be accommodated by expansion of the substation (39).

- Solid waste is disposed of offsite in a licensed landfill. The amount of solid waste that would be generated by the National Test Facility has not been estimated, but it is anticipated to be a relatively small volume (10).

- Sewage treatment capacity is currently adequate but the construction of the National Test Facility requires an expansion of the capacity of the sewage treatment plant by 0.124 million gallons/day (39). The expansion could encroach on a flood plain. All impacts are anticipated to be mitigable (39).

- Construction and operation of the National Test Facility are projected to increase water requirements from 0.37 million gallons/day to 1.0 million gallons/day (39). Mitigation measures such as conservation, reuse, and drought-tolerant landscaping would reduce the projected water requirements to 0.5 million gallons/day (39). Additional mitigation measures would have to be implemented to prevent exceeding water supply.

- Transportation system capacity exceeds current traffic demands. The addition of the National Test Facility would create significant increases in vehicular traffic, but would be below design capacity; however, increased delays would occur at some intersections (39).

Hazardous Waste

Any hazardous waste would be disposed of in accordance with current applicable regulations (10, 12).

Land Use

There are no current land use or zoning conflicts (11). No conflicts are anticipated for the development and operation of the National Test Facility (39). Expansion of the sewage treatment plant could encroach on a flood plain. This impact can be mitigated through the use of standard flood control measures.

Visual Resources

The current visual landscape is a rolling agricultural grassland (39). The National Test Facility will have an insignificant additional impact on the visual resources because it will be adjacent to an existing building (39).

Cultural Resources

No cultural resources have been identified on the facility; therefore, impacts are insignificant (39).

Noise

Due to the administrative and industrial nature of the existing facilities on Falcon Air Force Station, impacts from construction and operation are anticipated to be insignificant (39).

Socioeconomics

Unemployment in El Paso County of 5.4 percent (8,800 persons) in 1984, and an adequate availability of housing, indicate that the socioeconomic impacts of the growth resulting from construction and operation of the National Test Facility would be insignificant (39).

The environmental consequences associated with the construction and operation of the National Test Facility are mitigable by the measures described in the "National Test Facility Environmental Assessment" (39). No significant environmental consequences have been identified associated with the operation of the interim National Test Facility based on the "Request for Environmental Impact Analysis" (Control Number AFSPC 86-1) (41, 42).

3.1.4 Rome Air Development Center

Rome Air Development Center would conduct BM/C^3 test activities that involve analyses, simulations, and component/assembly testing related to command, control, and communications architectures and integration. The facilities to be used already exist, but a 20 x 50-foot annex would be added to contain a small cryogenic chamber (31). The equipment that would be required to conduct the tests has yet to be chosen but a residual gas analysis machine, a phase-shifting interferometer, and a holographic camera have been purchased (31). About five staff may be required, an increase of 0.1 percent over the 7,700 military and civilian staff onbase (31).

BM/C^3 testing would be scheduled for one test per month over the next 2 years; each test would take about 3 weeks for preparation and between 2 and 5 days to run (31).

The Rome Air Development Center is in compliance with all of their permit requirements (10, 12). Also, the resources of the surrounding community are adequate to accommodate the proposed testing.

Staff additions and new construction would be minor. Thus, the impacts from Demonstration/Validation activities are anticipated to be insignificant.

3.1.5 Nevada Test Site

Demonstration/Validation activities for BM/C^3 at the Nevada Test Site would include the exposure of components and assemblies to a nuclear environment. The dedicated use of the Nevada Test Site includes such activities and BM/C^3 testing would take advantage of underground nuclear tests scheduled for other programs (18). No facility modifications are anticipated and no additional staff or infrastructure services would be necessary as a consequence of BM/C^3 activities (64). Also, the Nevada Test Site meets all applicable environmental standards. Therefore, the environmental consequences of the BM/C^3 activities at the Nevada Test Site are expected to be insignificant.

3.1.6 Harry Diamond Laboratories

Adelphi, Maryland

Demonstration/Validation test activities for BM/C^3 in the Aurora Facility at Harry Diamond Laboratories, Adelphi, Maryland, would involve testing hardened circuitry exposed to gamma radiation. The radiation chamber is used regularly on a year-round schedule. Tests are conducted three times per day, using the regular staff (1, 2). Testing for the Strategic Defense Initiative program would require minor staff level adjustments (1).

Due to priority status of the Strategic Defense Initiative program, previously scheduled tests would be rescheduled to accommodate testing of BM/C^3 (1). Therefore, testing of BM/C^3 components would not represent an increase in the number of tests run per year at the Aurora Facility. Testing for the Strategic Defense Initiative program would require a small increase in staff of the Aurora Facility (1), although this is insignificant in the context of the over 1,800 staff at the Adelphi site.

The result of applying the four assessment criteria against the test activities and their associated facilities shows no potential for environmental effects related to BM/C^3 testing. This conclusion is based on the presence of adequate facilities, insignificant staff increases, compliance with environmental standards, and adequate resources in the surrounding community (20).

Environmental consequences associated with BM/C^3 Demonstration/Validation activities at the Aurora Facility, Harry Diamond Laboratories, Adelphi site are expected to be insignificant.

Woodbridge, Virginia

Environmental impacts at Harry Diamond Laboratories, Woodbridge Research Facility, Woodbridge, Virginia, beyond those that result from normal operations, would not be expected from BM/C^3 testing. The electromagnetic pulse test facility is utilized on a regular basis, and involves all the permanent staff (33).

Due to the priority status of the Strategic Defense Initiative program, previously scheduled tests would be rescheduled to accommodate testing of the BM/C^3 (1). Therefore, testing of BM/C^3 components would not represent an increase in the number of tests run per year at the Woodbridge Research Facility, no staff increases would be anticipated, and adequate resources are available in the surrounding community.

The Woodbridge Research Facility is in compliance with environmental standards (20). Electromagnetic pulse test facilities are the subject of a civil action for failure to provide adequate and required National Environmental Policy Act environmental documentation on their electromagnetic pulse program. The staff at Harry Diamond Laboratories are currently in the process of preparing the required site-specific environmental documentation (26). Although testing associated with the BM/C^3 program would not significantly increase the regularly scheduled electromagnetic pulse testing at the Woodbridge Research Facility, mitigations, if any, cited in the environmental documentation in preparation must be adhered to in all electromagnetic pulse testing.

3.2 ENVIRONMENTAL CONSEQUENCES OF NO ACTION

If the no-action alternative is selected, no additional environmental consequences are anticipated. Concept Exploration would continue at currently staffed facilities with no changes in operations.

3.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the BM/C^3 through the Demonstration/Validation stage would result in irreversible and irretrievable commitment of resources such as electronic components, various metallic and nonmetallic structural materials, fuel, and labor. This commitment of resources is not different from those necessary for many other aerospace research and development programs; it is similar to the activities that have been carried out in previous aerospace programs over the past several years.

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APPENDIX A
TEST ACTIVITY DESCRIPTIONS

The Demonstration/Validation test activities have been divided into four categories: analyses, simulations, and component/assembly testing. This Appendix describes in greater detail the simulations, component/assembly tests, and flight tests identified in Section 1.3.

SIMULATION TESTING

Simulation testing of a physical entity (machine, system component, etc.) is accomplished by developing a computer model of that entity. The model then interacts with data representing physical stimuli to assess the entity's capabilities in real-world conditions. A simulation involves writing and running computer programs, with possible interfaces to other systems or system elements. No impacts on the physical environment are involved other than the commitment of manpower and electrical energy involved in computer operations.

COMPONENT/ASSEMBLY TESTING

The basic concept of component/assembly testing is to control the physical conditions in which the hardware item is tested. Tests are typically conducted in specialized environments, and data are collected regarding the performance of the hardware item in that environment. The scope of the tests may range from single microchip components up to major subassemblies. This section describes those special environments and the tests to be performed.

Nuclear Radiation Chambers

The object of a radiation chamber is to determine the detrimental effects of various types of radiation. Radiation testing (other than that involving nuclear explosions) can be accomplished by exposing materials to:

- Radiation from a research or test nuclear reactor
- A beta/gamma radioactive source, such as cobalt-60 or cesium-137, in an exposure chamber or pool
- Nuclear particles in an accelerator (Van de Graff, cyclotron, etc.) in a target room (requires very large power source)
- X rays from an x-ray machine (requires large power source).

The specific device used will depend on the type of radiation, energy, and intensity desired, the size of the object, and the availability of the facility.

Nuclear Testing

Underground nuclear explosion testing is performed by drilling a vertical shaft and establishing a detonation chamber at the bottom. Test objects are

placed in horizontal tunnels leading away from the detonation chamber, and exposed to the high-intensity radiation pulse from the detonation. Usually one detonation serves many experiments and tests. Impacts on the physical environment include the commitment of an underground volume to radioactive contamination, the disposal of drilling spoils, and the fracturing of geological structures from the detonation. No fission products are emitted to the atmosphere.

FINDING OF NO SIGNIFICANT IMPACT

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
U.S. DEPARTMENT OF DEFENSE

AGENCY: Department of Defense

ACTION: Decision to conduct Demonstration/Validation tests of the Battle Management/Command and Control, and Communications (BM/C^3).

BACKGROUND: Pursuant to Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act of 40 CFR Parts 1500-1508, and Department of Defense (DoD) Directive on Environmental Effects in the United States of DoD Actions, the DoD has conducted an assessment of the potential environmental consequences of Demonstration/Validation testing of Battle Management/Command and Control, and Communications developed by the Strategic Defense Initiative Organization.

SUMMARY: Demonstration/Validation would involve three types of tests: analyses, simulations, and component/assembly tests. The locations of test activities for the Battle Management/Command and Control, and Communications are:

FACILITY	TYPE
Alabama	
Advanced Research Center	Analyses, Simulations, Component/Assembly Tests
Colorado	
National Test Facility, Falcon Air Force Station	Analyses, Simulations, Component/Assembly Tests
Maryland	
Harry Diamond Laboratories	Component/Assembly Tests
Massachusetts	
Electronic Systems Division	Analyses, Simulations, Component/Assembly Tests

Nevada

Nevada Test Site	Component/Assembly Tests

New York

Rome Air Development Center, Griffiss Air Force Base	Analyses, Simulations, Component/Assembly Tests

Virginia

Harry Diamond Laboratories	Component/Assembly Tests

To determine the potential for significant environmental impacts of the Demonstration/Validation of Battle Management/Command and Control, and Communications, the magnitude and frequency of the tests that would be conducted at proposed test locations were compared to the current activities at those locations.

To assess impacts, the activity was evaluated in the context of the environmental considerations for air, water, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be insignificant if no serious concerns existed regarding potential impacts of the potentially affected area. Consequences were deemed mitigable if concerns existed but it was determined that all of those concerns could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious concerns were identified that could not be readily mitigated, the activity was determined to represent potentially significant consequences.

FINDING: No significant impacts would result from analyses, simulations, and component/assembly testing of Battle Management/Command and Control, and Communications.

FURTHER
INFORMATION: A copy of

Battle Management/Command and Control, and Communications,
Demonstration/Validation Program,
Environmental Assessment,
July 1987

is available from

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Dated 31 July 1987

James L. Graham, Jr.
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